CTS of Asheville - VI Assessment Report and draft letters
Wallace, Matthew E
to:
Samantha Urquhart-Foster
12/21/2012 03:45 PM
Cc:
Elizabeth Ahlemann
Hide Details
From: "Wallace, Matthew E" <Matthew.Wallace@amec.com>

To: Samantha Urquhart-Foster/R4/USEPA/US@EPA

Cc: Elizabeth Ahlemann <Elizabeth.Ahlemann@ctscorp.com>

History: This message has been replied to and forwarded.

4 Attachments

CTS of Asheville - VI Assessment Report.pdf

CTS of Asheville VI Assessment - Letter to Resident at (b)(6)

CTS of Asheville VI Assessment - Letter to Resident at

CTS of Asheville VI Assessment - Letter to Resident at

Samantha,

Attached is the Vapor Intrusion Assessment Report, along with the draft letters to homeowners communicating the results of the sampling. Please acknowledge receipt of these files.

The EDD will also be provided for the data.

Please note, I will be on vacation until January 2, 2013.

Happy holidays!

Matt

Matthew E. Wallace, P.E.
AMEC
Environment & Infrastructure, Inc.
Principal Engineer / Project Manager
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VAPOR INTRUSION ASSESSMENT REPORT

CTS OF ASHEVILLE, INC. SUPERFUND SITE

235 Mills Gap Road
Asheville, Buncombe County, North Carolina
EPA ID: NCD003149556
CERCLA Docket No. CERCLA-04-2012-3762

Prepared for:

CTS Corporation
905 West Boulevard North
Elkhart, Indiana 46514

Prepared by:

AMEC Environment & Infrastructure, Inc.
1308 Patton Avenue
Asheville, North Carolina 28806

AMEC Project 6252-12-0006

December 21, 2012

December 21, 2012

Ms. Samantha Urquhart-Foster
Superfund Remedial and Site Evaluation Branch
U.S. Environmental Protection Agency
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960
Urquhart-Foster.Samantha@epa.gov

Subject: **Vapor Intrusion Assessment Report**
CTS of Asheville, Inc. Superfund Site
235 Mills Gap Road, Asheville, Buncombe County, North Carolina
EPA ID: NCD003149556
CERCLA Docket No. CERCLA-04-2012-3762
AMEC Project 6252-12-0006

Dear Ms. Urquhart-Foster:

Please find attached the Vapor Intrusion Assessment Report (VI Report) for the above-referenced Site. AMEC Environment & Infrastructure, Inc. prepared this VI Report on behalf of CTS Corporation pursuant to the requirement set forth in Section 1.3.4 of the Scope of Work contained in Appendix A of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study between the United States Environmental Protection Agency Region 4 and CTS Corporation (effective date of January 26, 2012).

If you have questions regarding this VI Report, please contact us at (828) 252-8130.

Sincerely,

AMEC Environment & Infrastructure, Inc.

Susan E. Kelly, P.E., L.G.
Senior Engineer

Matthew E. Wallace, P.E.
Principal Engineer

NORTH CAROLINA PROFESSIONAL SEAL 24933 ENGINEER MATTHEW E. WALLACE 12/21/12

SEK/MEW:sek

cc: Elizabeth Ahlemann, CTS Corporation
Michael Dolan, Jones Day
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LIST OF ACRONYMS

AMEC	AMEC Environment & Infrastructure, Inc.
cis-1,2-DCE	cis-1,2-dichloroethene
COPC	constituent of potential concern
HI	Hazard Index
IRIS	Integrated Risk Information System
MDL	method detection limit
$\mu g/m^3$	micrograms per cubic meter
MGRA	Mills Gap Road Associates
OSWER	USEPA Office of Solid Waste and Emergency Response
RPD	relative percent difference
RfC	reference concentration
TCE	trichloroethene (also, trichloroethylene)
URF	unit risk factor
USEPA	United States Environmental Protection Agency
VI	vapor intrusion
VISL	Vapor Intrusion Screening Level
VOC	volatile organic compound

EXECUTIVE SUMMARY

AMEC Environment & Infrastructure, Inc. (AMEC), on behalf of CTS Corporation, conducted this vapor intrusion (VI) assessment for the CTS of Asheville, Inc. Superfund Site (Site). This VI assessment was conducted pursuant to Section 1.3.4 of the Scope of Work contained in Appendix A of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study between the United States Environmental Protection Agency (USEPA) and CTS Corporation (Respondent). This VI Assessment Report describes the activities that were undertaken to evaluate potential vapor intrusion at residences located contiguous to the Site and proximate to the currently known contaminated groundwater plume.

This VI assessment was conducted in accordance with the USEPA-approved Vapor Intrusion Assessment Work Plan (Revision 2) dated September 11, 2012. The objective of this VI assessment was to determine whether concentrations of Site-related volatile organic compounds (VOCs) are present in crawlspaces at residences previously assessed by USEPA that are contiguous to the Site and/or proximate to the currently known contaminated groundwater plume. The detected analytes were compared to risk-based screening values to determine the potential for the occurrence of vapor intrusion to pose a risk to the residential receptors.

Previous investigations have identified VOCs at the Site, primarily trichloroethene (TCE). The TCE groundwater plume generally extends from the area of the former facility to areas east and west of the Site, coincident with the direction of shallow groundwater flow. Groundwater discharge zones are located east and west of the Site at seeps and springs. Unnamed tributaries form at these seep/spring areas and flow topographically away from the source seep/spring. The objective of the VI assessment was to determine if indoor air at residences located in the vicinity of the groundwater plume was being impacted by TCE and TCE degradation products.

The USEPA-approved VI Work Plan described the collection of six crawlspace air samples at residences located east and west of the Site in the vicinity of the groundwater plume and seep/spring areas. Ambient air samples were to be collected upwind of the crawlspace sample locations, as well as between the seep/spring areas and the crawlspace sample locations. Access to the three residences east of the Site was not granted by the property owners; therefore, air samples were not collected at the planned locations east of the Site. The VI assessment included collection of three crawlspace air samples, a basement air sample, and two associated ambient air samples from locations west of the Site. The air samples were submitted for Site-specific VOCs according to USEPA Method TO-15 SIM (selective ion monitoring).

Not considering data gaps related to air samples not being collected at locations where property access was not granted, which is out of control of the Respondent, the data collected for the assessment is considered 100 percent complete and usable for meeting the objectives presented in the VI Work Plan.

Concentrations of TCE, cis-1,2-dichloroethene, and/or vinyl chloride were detected in the collected air samples. Concentrations of detected constituents during this 2012 VI assessment are generally similar to or slightly less than constituent concentrations detected during previous sampling events conducted by USEPA and its subcontractors.

Concentrations of TCE were detected in each of the collected crawlspace/basement air samples. Risk calculations for the crawlspace air samples were completed by estimating indoor air exposure concentrations using an attenuation factor and comparing these concentrations to inhalation toxicity benchmarks. Risk calculations were completed using the detected air concentration of TCE in the residential basement air sample and comparing these calculated concentrations to inhalation toxicity benchmarks. The estimated incremental risk from vapor intrusion in indoor air for the three sampled residences for child residents ranges from 1×10^{-7} to 3×10^{-7}. The estimated incremental risk from vapor intrusion in indoor air for the three sampled residences for adult residents ranges from 4×10^{-7} to 1×10^{-6}. The estimated hazard indices (HIs) for TCE vapor intrusion to indoor air range from 0.1 to 0.2 for both residential adults and children. The estimated HIs are less than 1 and the incremental risks are equal to or less than 1×10^{-6}; therefore, based on these results, the vapor intrusion pathway would not pose an unacceptable hazard or risk to current or future residential receptors living at the sampled residences.

Concentrations of TCE were detected in each of the collected ambient air samples. Risk and hazards associated with ambient air exposures were compared to inhalation toxicity benchmarks. The estimated incremental risk from ambient air for the two sample locations for child residents ranges from 1×10^{-7} to 5×10^{-7}. The estimated incremental risk from ambient air for the two sample locations for adult residents ranges from 3×10^{-7} to 2×10^{-6}. The estimated HIs for TCE vapor intrusion to indoor air range from 0.07 to 0.3 for both adults and children. The estimated hazards and risks indicate little discernable difference between air in the crawlspace/basement areas in the residences and the outdoor ambient air. Based on the measured crawlspace/basement air concentrations, the estimated HIs and incremental risks do not indicate unacceptable risk or hazards for residential receptors potentially exposed via indoor air.

The TCE air concentrations measured in the residential air samples, and the ambient air samples, are within the 1990 to 2005 national background indoor air concentrations range of 50th percentiles for TCE. The USEPA national background indoor air concentration data were collected from homes not known or expected to be located over soil or groundwater contamination or those having effective vapor intrusion mitigation systems in place; therefore, the national background indoor air concentrations represent typical background indoor air concentrations.

The estimated HIs and incremental risks do not indicate unacceptable risk or hazards for residential receptors potentially exposed via indoor air vapor, and the measured air concentrations are within the national background indoor air concentrations; therefore, the need for additional indoor air sampling in the residences is not indicated at this time.

1.0 INTRODUCTION

AMEC Environment & Infrastructure, Inc. (AMEC), on behalf of CTS Corporation, has prepared this Vapor Intrusion Assessment Report (VI Report) for the CTS of Asheville, Inc. Superfund Site (Site). This VI Report describes work conducted in accordance with the Vapor Intrusion Assessment Work Plan, Revision 2 (VI Work Plan), dated September 11, 2012 (AMEC, 2012), which was approved by the United States Environmental Protection Agency (USEPA) in a letter dated September 13, 2012. The Vapor Intrusion Assessment was conducted pursuant to Section 1.3.4 of the Scope of Work contained in Appendix A of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/ Feasibility Study (Settlement Agreement) between the USEPA and CTS Corporation (effective date January 26, 2012). This VI Report describes the activities that were undertaken to evaluate potential vapor intrusion at residences located contiguous to the Site and proximate to the currently known contaminated groundwater plume.

1.1 SITE DESCRIPTION

The Site is approximately nine acres on Mills Gap Road in Asheville, Buncombe County, North Carolina and the areal extent of the contamination. The approximate center of the Site is located at north latitude 35°29'36" and west longitude 82°30'25" (Figure 1). The Site formerly contained an approximate 95,000-square foot, single-story brick and metal structure in the southern portion of the Site (Figure 2). The building was demolished in December 2011 and the concrete building pad remains intact. The northeastern portion of the Site contains an asphalt-paved parking area and asphalt-paved driveways are located parallel to the north (front) of the former building and southeast (rear) of the former building. A six-foot high chain-link fence surrounds the Site and a locked gate at the north end of the Site controls access to the Site from Mills Gap Road. The Site is unoccupied.

1.2 SITE OPERATIONAL HISTORY

International Resistance Company owned and operated a manufacturing facility at the Site from 1952 until 1959, when CTS of Asheville, Inc. purchased the real property, building, and equipment. CTS of Asheville, Inc. manufactured electronic components at the facility from 1959 until April 1986. Arden Electroplating, Inc. leased a portion of the

building from approximately December 1, 1985 until November 30, 1986, and the Site was conveyed to Mills Gap Road Associates (MGRA) on December 23, 1987. MGRA reportedly leased portions of the facility to various tenants, and otherwise utilized the building for business interests. The Site has been vacant/unoccupied since the mid-1990s.

Electronic components utilized in automotive parts and hearing aids were manufactured by CTS of Asheville, Inc. until plant operations ceased in April 1986. Small electronic components were electroplated with tin, nickel, zinc, and silver as one step in the process. Wastes generated from the process included sludge containing heavy metals and solvents. Solvents, including trichloroethene (TCE) and acetone, were used in the process to clean and/or degrease metal objects prior to electroplating.

Disposal/recycling activities at the facility prior to 1959 are unknown. From 1959 to 1986, solvents and metals were reportedly reclaimed whenever possible. Between 1959 and 1980, metal-bearing rinse waters and alkaline cleaners that could not be reclaimed from the electroplating process were reportedly disposed of through the municipal sewer system, while concentrated metals and solvent wastes were placed in drums for off-site disposal/recycling. After 1980, wastes were accumulated in drums on-site prior to off-site disposal or recycling.

1.3 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Environmental investigations have been conducted at the Site by several entities since 1987. The results of previous investigations have been described in other Site documents, and will be presented in the Remedial Investigation/Feasibility Study Work Plan to be prepared for the Site. The results of previous investigations have identified volatile organic compounds (VOCs) at the Site.

Although the shallow/overburden TCE groundwater plume has not been completely delineated, the plume is expected to terminate near or slightly beyond the seep/spring areas east and west of the Site. Volatilization of TCE and degradation products from the groundwater plume represents a potential pathway for vapor intrusion into residential structures located in the vicinity of the groundwater plume. The surface waters that

emanate from the springs east and west of the Site contain TCE; therefore the volatilization of TCE from the surface waters is a pathway for contamination of ambient air in the vicinity of the surface waters.

Soil contamination associated with the Site has not been identified on adjacent properties; therefore, volatilization of constituents from soil contamination is not expected to contribute to vapor intrusion into residences located adjacent to the Site property. The primary pathway for vapor intrusion into residences located adjacent to the Site is from volatilization of constituents from the shallow groundwater plume that extends east and west from the Site. Limited air sampling has been conducted at the Site and has included sampling of soil gas, crawlspace air, indoor air, and ambient/outside air.

The USEPA and their subcontractors collected air sampling in the vicinity of the Site in December 2007. The sampling included 10 subslab and 12 crawlspace air samples collected from 22 residences in the area of the Site, as well as ambient air and 'slam bar' soil gas samples (T N & Associates, 2008). A Trace Atmospheric Gas Analyzer IIe (TAGA) was also used to screen air quality in the area of the Site. TCE was detected in crawlspace air samples collected at residences located on properties adjacent to the Site at concentrations ranging from an estimated concentration of 0.243 micrograms per cubic meter ($\mu g/m^3$) at (b)(6) west of Site) to 20.3 $\mu g/m^3$ at (b)(6) (east of Site). Concentrations of detected constituents in the subslab and crawlspace air samples were not above applicable removal levels established at that time.

In August 2008, USEPA and their subcontractors collected five crawlspace air samples, two indoor air samples, and one soil gas sample (as well as ambient and duplicate air samples) from six residences in the area of the Site (T N & Associates, 2009). TCE was detected in crawlspace air samples collected at residences located on properties adjacent to the Site at concentrations ranging from an estimated concentration of 1.15 $\mu g/m^3$ at (b)(6) (b)(6) (west of Site) to 7.41 $\mu g/m^3$ at (b)(6) (east of Site). Concentrations of detected constituents in the air samples were not above applicable removal levels established at that time.

Ambient air samples were collected during the aforementioned sampling events. Concentrations of TCE detected in the ambient air samples were highest near the seep/spring areas. The concentration of TCE in the vicinity of the springs east of the Site during the August 2008 air sampling event was 1,490 $\mu g/m^3$ and the concentration of TCE in the vicinity of the spring(s) west of the Site during the August 2008 air sampling event was 5.24 $\mu g/m^3$ (T N & Associates, 2009). The concentrations of TCE detected in other ambient air samples decreased with distance from the seep/spring areas.

1.4 OBJECTIVE OF VAPOR INTRUSION ASSESSMENT

The objective of the VI assessment, as proposed in the VI Work Plan, is in accordance with Section 1.3.4 of the Settlement Agreement, which requires evaluation of vapor intrusion at residences immediately contiguous to the Site and/or proximate to the currently known groundwater plume, some of which were previously assessed by USEPA. The extent of the groundwater plume at the Site has not been delineated; therefore, the air sampling locations were at those residences nearest the groundwater plume as it is known at this time. As additional data is collected during implementation of the Remedial Investigation and the conceptual site model becomes more developed, the potential vapor intrusion pathway with respect to vapor intrusion sources will become more fully understood and additional vapor intrusion assessment might be necessary. This VI assessment was intended to evaluate current conditions at residences that were previously assessed by USEPA and/or residences that are nearest to the currently known groundwater plume at the Site. The detected analytes were compared to risk-based screening values to indicate the potential for the occurrence of vapor intrusion to pose a potential risk to the residential receptors.

2.0 VAPOR INTRUSION ASSESSMENT ACTIVITIES

The VI assessment was conducted in accordance with the USEPA-approved VI Work Plan, which included a Field Sampling and Analysis Plan and Quality Assurance Project Plan. The VI Work Plan was developed to evaluate potential vapor intrusion at residences located contiguous to the Site and/or proximate to the currently known contaminated groundwater plume. The collected air samples were analyzed for TCE, which is the primary volatile constituent known to be present in groundwater associated with the Site, as well as compounds that are degradation products of TCE.

2.1 SAMPLING ACTIVITIES

The VI Work Plan described the collection of six crawlspace air samples and six associated ambient air samples. The owners of three residences located east of the Site (b)(6) did not allow access to their properties for collection of crawlspace air samples; therefore, three of the planned crawlspace air samples and the four associated ambient air samples were not collected.

A USEPA representative accompanied AMEC during the sampling activities. A USEPA representative did not accompany AMEC personnel during surveying of the sample locations.

2.1.1 Access to Sample Off-Site Properties

The USEPA sent access agreements to property owners where air samples were proposed to be collected prior to initiating the air sampling activities. The access agreements requested access for AMEC and USEPA personnel to enter the subject property for collection of air samples. Access agreements were obtained from the owners, or owner's representative, of the following properties:

(b)(6)

- Southside Village common area (Buncombe County PINs: 9655-62-0808, 9655-52-9062, and 9655-52-3990)
- Buncombe County PIN 9655-53-7351 (vacant property where the unnamed tributary emanating from the springs west of the Site is located)

The signed access agreements are included in Appendix A.

Access agreements were also sent to the owners of the following properties; however, signed access agreements were not received by USEPA to allow sampling on their properties:

(b)(6)

Property owners were notified by USEPA of the date of the sampling activities and USEPA coordinated a time for the property reconnaissance with each resident. AMEC coordinated the sample deployment/retrieval date and time with each resident during the reconnaissance.

2.1.2 Interior Sample Locations

Prior to collecting interior air samples, the interior of each residence to be sampled was surveyed to collect information about the structure (e.g., configuration, presence/absence of a vapor barrier, heating/cooling systems, etc.) and to assess factors that could influence the air sampling results (e.g., products or chemicals containing VOCs). An Occupied Dwelling Questionnaire was completed in coordination with the occupant of the residence. The completed Occupied Dwelling Questionnaire forms are included in Appendix B.

Interior air samples were collected from the following three residences, which are located west of the Site (Figure 3):

(b)(6) (sample ID: CAS-01)
(sample ID: CAS-02)
(sample ID: CAS-03)

The residence at (b)(6) is a one-story duplex unit with a crawlspace. The ground surface of the crawlspace is soil and is covered with a polyethylene moisture barrier. There were no items being stored in the crawlspace during the sampling activities. Five air vents were observed in the crawlspace walls that allow air exchange between the

outside and the crawlspace. The crawlspace air sample (CAS-01) was collected in the approximate center of the crawlspace. A field duplicate sample (FD-01) was collected in series with CAS-01. Photographs of the sampling area are provided in Appendix C.

The residence at (b)(6) is a two-story duplex unit and does not contain a crawlspace. The lower level of the residence is a partially-finished walk-out basement constructed with a concrete slab-on-grade. The lower level contains finished living space (e.g., bedrooms, bathrooms, and a living room) and several unfinished rooms, including a workshop room, an office/storage room, and a storage room. The resident indicated that he formerly refinished/repaired furniture; however, he had not done so recently and had removed some of the chemicals used for furniture refinishing/repair (Note: some paints, glues, etc. were observed in the lower level office/storage area). The workshop room contains an air exchanger, and the homeowner indicated he turned the air exchanger off on the morning of October 16, 2012, and the air exchanger remained off during the sampling activities. Although the residence did not contain a crawlspace, an air sample (CAS-02) was collected in the approximate center of the lower level, and the sample identification nomenclature was kept consistent with that proposed in the VI Work Plan (i.e., "CAS" for crawlspace air sample). Photographs of the sampling area are provided in Appendix C.

The residence at (b)(6) s a two-story duplex unit with a crawlspace. The ground surface of the crawlspace is soil and the majority of the crawlspace is covered with a polyethylene moisture barrier (i.e., there are areas/gaps with exposed soil). Two air vents were observed in the northern crawlspace wall that allow air exchange between the outside and the crawlspace. Several items, including paint and a 'weed eater', were stored near the crawlspace entrance. The crawlspace air sample (CAS-03) was collected in the approximate center of the crawlspace. Photographs of the sampling area are provided in Appendix C.

2.1.3 Ambient Air Sample Locations

An ambient air sample (AAS-01) was collected at a location between the residence at (b)(6) (b)(6) and the unnamed tributary north of (b)(6) A field duplicate sample (FD-02) was collected in series with AAS-01.

A second ambient air sample (AAS-02) was collected from a location that was upwind of the sampled residences at the time the sample canisters were deployed. The wind direction appeared to be from the west during sample deployment; therefore AAS-02 was located in an open area west of the residences.

2.1.4 Sample Collection

Air samples were collected using individually-certified, 6-Liter, electropolished, stainless steel (SUMMA®) canisters. The canisters were equipped with individually-certified flow controllers that were set to collect an air sample over a 24-hour period. The interior air sample canisters were placed on the floor/ground surface for sample collection and the sample inlet height ranged from 1.7 feet above ground surface (CAS-02 and CAS-03) to 2.5 feet above ground surface (CAS-01/FD-01). The ambient air samples were secured to a fence post driven into the ground at the sample locations and the sample inlet height was 5.4 feet above ground surface at AAS-01/FD-02 and 5.2 feet above ground surface at AAS-02.

Individually-certified vacuum gauges were attached to each canister and sample personnel recorded each vacuum gauge reading at the beginning and end of sample collection. The air temperature was also recorded at the beginning and end of sample collection (for crawlspace air samples, the interior/crawlspace temperature and ambient/outdoor temperature were both recorded). A calibrated photoionization detector was used to measure potential volatile vapors in the vicinity of the sample canister. Each canister was deployed for 24 hours and a sample tag was affixed to each canister during deployment and shipment to the laboratory. Copies of the field data records and logbook for the sampling activities are included in Appendix D. Table 1 contains a summary of the air samples collected and quality assurance/quality control samples submitted to the laboratory. Copies of the laboratory certifications for the canisters, flow controllers, and vacuum gauges are included in Appendix E.

The air samples were shipped under chain-of-custody protocol via overnight delivery (FedEx) to Columbia Analytical Services (part of ALS Group, Inc.) in Simi Valley, California.

2.2 ANALYSIS OF AIR SAMPLES

The air samples were submitted for analysis of the following Site-related VOCs according to USEPA Method TO-15 SIM (selective ion monitoring):

- trichloroethene
- cis-1,2-dichloroethene (cis-1,2-DCE)
- trans-1,2-dichloroethene
- vinyl chloride

3.0 ANALYTICAL RESULTS AND DATA USABILITY

The following sections describe the laboratory analytical results of the submitted air samples, as well as the results of data validation and data usability. The laboratory analytical report is included as Appendix F.

Three constituents (TCE, cis-1,2-DCE, and vinyl chloride) were detected in the indoor/ crawlspace air samples. Two constituents (TCE and cis-1,2-DCE) were detected in the ambient air samples. A summary of the analytical results is presented in Table 2.

3.1 DATA VALIDATION

Data validation was conducted based on procedures in the USEPA Region 4 Data Validation Standard Operating Procedures for Organic Analysis (USEPA, 2008), in conjunction with Method TO-15 SIM and the laboratory's Method TO-15 standard operating procedure. Full validation, including raw data verification and calculation checks, was completed on the laboratory data.

The data validation narrative is included in Appendix G. The results of the data validation did not indicate the presence of quality control issues.

3.2 DATA USABILITY SUMMARY

The field investigation was conducted as proposed in the VI Work Plan, with the following discrepancies:

- The vacuum gauge reading on FD-01 was -24 inches of mercury ("Hg) at the time of deployment, which is less than the criteria presented in the FSAP of greater than 25"Hg. FD-01 was collected in series with CAS-01 during sample collection and a comparison of the analytical results of the two samples indicate a relative percent difference (RPD) of 3 percent, which is less than the RPD criteria of <50 percent. Deployment of the FD-01 sample canister when the vacuum was slightly less than specified does not appear to have negatively affected the analytical results, or associate quality control results, of the collected sample.
- The air sample collected at (b)(6) [redacted] was collected in a basement area that contained finished and unfinished areas. It was not known until the reconnaissance of the residence that the structure did not contain a crawlspace. An air sample was collected in the approximate center of the basement to provide

information regarding vapor intrusion in the residence, which was the overall objective of the VI Assessment.

The field investigation was conducted as proposed in the VI Work Plan, with the following data gaps:

- Crawlspace air samples not collected at the following residences: (b)(6)
- The following ambient samples, which were to be collected in association with the crawlspace samples at the residences at (b)(6) were not collected:
  - Between springs/seep area an(b)(6)
  - Between springs/seep area an
  - Upwind o
  - Upwind o(b)(6)

Data quality issues were not identified during the data validation process. The data gaps that were identified were out of the control of AMEC or the Respondent (i.e., property access was not granted). The data set is considered to be 100 percent complete with respect to the collected data. Therefore, the data is usable for the completing the objectives set forth in the VI Work Plan.

4.0 SCREENING-LEVEL RISK EVALUATION

AMEC evaluated the potential impact of groundwater contamination at the Site on current and future indoor air quality for residences located contiguous to the west of the Site and proximate to the currently known contaminated groundwater plume. Air samples were collected on October 18, 2012, at three residences and two ambient air locations (Figure 3). Two VOCs, TCE and cis-1,2-DCE, were detected in each of the three residence air samples and ambient air samples. Vinyl chloride was also detected in one of the residence air samples. The analytical data for the October 2012 air samples are summarized in Table 2. Risk assessment tables are included in Appendix H.

4.1 EXPOSURE ASSESSMENT

In order to identify constituents of potential concern (COPCs) for the vapor intrusion pathway, the detected air constituents were compared to target indoor air concentrations from the USEPA's Vapor Intrusion Screening Level (VISL) Calculator Version 2.0 and the USEPA Regional Screening Levels (RSLs) for Residential Air (USEPA, 2012a). These screening levels are presented in Table H.1 and are based on a residential exposure scenario with target carcinogenic risk of 10^{-6} and target hazard index of 0.1. In accordance with the VI Work Plan, the Target Residential Indoor VISLs/RSLs were divided by a crawlspace attenuation factor of 0.53 for comparison to crawlspace air samples. This crawlspace attenuation factor is the 95 percent upper confidence limit of the arithmetic mean for crawlspace to indoor air attenuation factors assembled by the USEPA (Table 19 in USEPA, 2012b). This attenuation factor is applicable for the air concentrations resulting from the samples collected in the crawlspaces at (b)(6) (b)(6) but not the air sample collected in the basement of the residence at (b)(6) or the two ambient air samples. TCE concentrations detected at the three residences, and one ambient air sample (AAS-01), were greater than the Target Residential Indoor VISL/RSL. As a result of this screening step, TCE was identified as an indoor air COPC and carried through the vapor intrusion screening-level risk evaluation. The detected concentrations of cis-1,2-DCE and vinyl chloride were below the Target Residential Indoor VISLs/RSLs and were not carried through the vapor intrusion screening-level risk evaluation.

4.2 TOXICITY ASSESSMENT

Toxicity values [Inhalation Reference Concentrations (RfCs) and Inhalation Unit Risks (IURs)] used in this evaluation were obtained from the USEPA Integrated Risk Information System (IRIS) (USEPA, 2012a). IRIS has released a Toxicity Assessment for TCE that recommends TCE be addressed as a potential mutagen with risk for kidney-related impacts being assessed using age-specific adjustment factors and with liver and non-Hodgkin lymphoma (NHL) risk addressed using the standard carcinogenic risk equations. Separate TCE IURs have been derived for the kidney and liver-NHL endpoints. These IURs, the age-specific adjustment factors used to adjust the exposure intakes, and the TCE RfC used in this assessment, are listed in Tables H.2 through H.11.

The RfC is used to estimate non-carcinogenic inhalation hazards. The RfC is an estimate of the daily exposure to the human population (including sensitive subgroups such as children and the elderly) that is likely to be without an appreciable risk of deleterious effects. The estimated hazard is compared to a target hazard index (HI) of 1. Cumulative hazards less than 1 are not likely to be associated with systemic or non-carcinogenic health risks. Non-carcinogenic hazards associated with inhalation exposures to TCE are associated with potential damage to the thymus and heart.

Using the endpoint-specific IURs for TCE, the cumulative carcinogenic risk for the indoor vapor intrusion pathway was calculated and compared to a target risk of 10^{-6}. If the cumulative carcinogenic risk for residents is less than 10^{-6}, risk is considered to be in the acceptable range under CERCLA. The IUR is characterized as an upper-bound estimate designed to be protective of the majority of the human population.

4.3 RISK CHARACTERIZATION

Incremental risks and hazards related to potential vapor intrusion into the residences were calculated using default adult and child resident exposure assumptions (Tables H.2 through H.11). The assessment assumes future residents will be present 350 days a year with exposure durations of 30 years for residential adults and 6 years for residential children (USEPA, 1991).

The crawlspace TCE air concentration from 108 Silk Tree Lane (0.67 $\mu g/m^3$), modified by the crawlspace attenuation factor of 0.53, was used to estimate the indoor TCE air concentration (0.355 $\mu g/m^3$). This indoor air concentration was then used to assess potential indoor air exposures and calculate incremental risks and hazards related to potential vapor intrusion into the residence at (b)(6) for both adult and child residents (Tables H.2 and H.3, respectively). The estimated incremental risk from vapor intrusion in indoor air is 8×10^{-7} for residential adults and 2×10^{-7} for residential children. The estimated hazard indices (HIs) for TCE vapor intrusion to indoor air are 0.2 for both residential adults and children. The estimated HIs are less than 1 and the estimated incremental risks are less than $1x10^{-6}$.

The crawlspace TCE concentration in the residence at (b)(6) (0.29 $\mu g/m^3$) is less than the crawlspace TCE concentration in the residence a(b)(6) (0.67 $\mu g/m^3$) and the estimated incremental risks and HIs for (b)(6) are also less than those estimated fo(b)(6) (Tables H.4 and H.5).

Based on these results, the vapor intrusion pathway would not pose an unacceptable hazard or risk to current or future residential receptors living at either (b)(6) o(b)(6)

For the residence at (b)(6) the basement TCE air concentration (0.44 $\mu g/m^3$), without attenuation, was used to assess potential indoor air exposures and calculate incremental risks and hazards related to potential vapor intrusion into the residence at(b)(6) for both adult and child residents (Tables H.6 and H.7, respectively). The estimated incremental risk from vapor intrusion in indoor air is 1×10^{-6} for residential adults and 3×10^{-7} for residential children. The estimated HIs for TCE vapor intrusion to indoor air are 0.2 for both residential adults and children. The estimated HIs are less than 1 and the estimated incremental risks are equal to or less than $1x10^{-6}$.

Based on these results, the vapor intrusion pathway would not pose an unacceptable hazard or risk to current or future residential receptors living at (b)(6)

Air concentrations in upper floors of the residences would be more diluted through mixing with other building air. Therefore, associated risks and hazards for these other areas are expected to be less than those calculated for the lower levels.

4.4 AMBIENT AIR EVALUATION

In addition to evaluating the potential indoor air exposures and calculating incremental risks and hazards related to potential vapor intrusion into the residences, risks and hazards associated with the ambient air concentrations were also evaluated for both residential adults and children. The risks and hazards associated with the ambient air samples collected near (b)(6) (AAS-01) are calculated in Tables H.8 and H.9 for residential adults and children, respectively. The estimated incremental risk from the AAS-01 TCE air concentration is 2×10^{-6} for residential adults and 5×10^{-7} for residential children. The estimated HIs for TCE are 0.3 for both residential adults and children. HIs are less than 1 and the estimated incremental risks are less than 1×10^{-6} for residential children. The estimated incremental risk for residential adults is greater than the target risk of 1×10^{-6}.

The risks and hazards associated with the ambient air sample collected in the western common area (AAS-02) are calculated in Tables H.10 and H.11 for residential adults and children, respectively. The estimated incremental risk from the AAS-02 TCE air concentration is 3×10^{-7} for residential adults and 1×10^{-7} for residential children. The estimated HIs for TCE are 0.07 for residential adults and children. The estimated HIs are less than 1 and the estimated incremental risks are less than 1×10^{-6}. Based on these results, exposure to the ambient air concentration of TCE in the western common area would not pose an unacceptable hazard or risk to current or future residential receptors.

The hazards and risks observed for the ambient air concentrations are consistent with those estimated for the crawlspace and basement air samples, with the ambient air sample AAS-01 having a slightly higher risk than the residential air samples.

4.5 UNCERTAINTY ANALYSIS

This assessment assumes that the air concentrations at the residences will remain consistent over time, although the detected constituents are potentially biodegradable. The assessment also assumes that the air concentrations within each residence will be uniform although air concentrations may vary within these structures due to locations of cracks, air flow, and mixing. The assessment assumes that future residents will be present 350 days a year with exposure durations of 30 years for residential adults and 6 years for residential children (USEPA, 1991). These assumptions would tend to overestimate risks because residential tenure in one location averages approximately 9 years (USEPA, 2011a).

4.6 COMPARISON TO PREVIOUS AIR INVESTIGATIONS

Crawlspace air samples were previously collected by USEPA and their subcontractors at two of the residences sampled during this VI assessment. A summary of the analytical results from the previous sampling events, as well as this VI assessment, is presented in Table 3. Concentrations of detected constituents during this 2012 VI assessment are generally similar to or slightly less than constituent concentrations detected during previous sampling events.

5.0 DISCUSSION AND CONCLUSIONS

The VI assessment was conducted in accordance with the USEPA-approved VI Work Plan. Not considering data gaps related to samples not being collected at locations where property access was not granted, which is out of control of the Respondent, the data collected for the assessment is considered 100 percent complete and usable for meeting the objectives presented in the VI Work Plan.

Concentrations of TCE, cis-1,2-DCE, and/or vinyl chloride were detected in the collected air samples. Concentrations of detected constituents during this 2012 VI assessment are generally similar to or slightly less than constituent concentrations detected during previous sampling events.

The concentrations of TCE detected at the three residences and one of the ambient air samples were greater than the Target Residential Indoor VISL/RSL. As a result of this screening step, TCE was identified as an indoor air COPC and carried through the vapor intrusion screening-level risk evaluation. The detected concentrations of cis-1,2-DCE and vinyl chloride were below the Target Residential Indoor VISLs/RSLs and were not carried through the vapor intrusion screening-level risk evaluation. Risk calculations were completed using the detected air concentrations of TCE in residential basement and ambient air samples and comparing these concentrations to inhalation toxicity benchmarks. Risk calculations for the crawlspace air samples were completed by estimating indoor air exposure concentrations using an attenuation factor and comparing these concentrations to inhalation toxicity benchmarks. Table 4 summarizes the risk and hazard estimates for the residences and ambient air concentrations.

The estimated hazards and risks indicate little discernable difference between air in the crawlspace/basement areas of the sampled residences and the outdoor ambient air. Based on the measured crawlspace/basement air concentrations, the estimated HIs and incremental risks do not indicate unacceptable risk or hazards for residential receptors potentially exposed via indoor air.

The TCE air concentrations measured in the ambient air and residential air samples (range of 0.15 to 0.67 $\mu g/m^3$) are within the 1990 to 2005 national background indoor air

concentrations range of 50th percentiles for TCE, which range from less than the reporting limit to 1.1 µg/m^3 (USEPA, 2011b). The USEPA national background indoor air concentration data were collected from homes not known or expected to be located over soil or groundwater contamination or those having effective vapor intrusion mitigation systems in place; therefore, the national background indoor air concentrations represent typical background indoor air concentrations.

The estimated hazards and risks do not indicate unacceptable risk or hazards for residential receptors potentially exposed via indoor air vapor, and the measured air concentrations are within the national background indoor air concentrations; therefore, the need for additional indoor air sampling in the residences is not indicated at this time.

6.0 REFERENCES

AMEC, 2012. Vapor Intrusion Assessment Work Plan (Revision 2), CTS of Asheville, Inc. Superfund Site, EPA ID: NCD003149556, September 11, 2012.

T N & Associates, Inc., USEPA Region 4 START, 2008. Subsurface Soil and Groundwater Sampling Report, Revision 1, Mills Gap, April 23, 2008.

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USEPA, 2008. Data Validation Standard Operating Procedures for Organic Analyses; USEPA Region 4, Science and Ecosystem Support Division Quality Assurance Section, MTSB; Athens, Georgia; August 2008.

USEPA, 2011a. Exposure Factors Handbook, 2011 Edition. EPA/600/R-090/052F, September 2011.

USEPA, 2011b. Background Indoor Air Concentrations of Volatile Organic Compounds in North America Residences (1990 – 2005): A Compilation of Statistics for Assessing Vapor Intrusion, EPA 530-R-10-001, June 2011.

USEPA, 2012a. Regional Screening Level Tables and Vapor Intrusion Screening Level Calculator, Version 2.0.

USEPA, 2012b. EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings, EPA 530-R-10-002, March 16, 2012.

TABLES

TABLE 1
Summary of Air Samples and Sampling Conditions
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
AMEC Project 6252-12-0006

Sample ID	Sample Location	Date Start	Time	Interior Air Temperature (°F)		Ambient Air Temperature (°F)		PID Reading (ppm)		Vacuum (inches Hg)	
			Start/Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop
CAS-01	(b)(6)	10/17/2012	9:15	57	58	45	58	0.0	0.0	-29.0	-7.0
CAS-02		10/17/2012	9:55	68	62	53	67	0.1	0.2	-29.4	-8.0
CAS-03		10/17/2012	11:05	59	61	55	63	0.0	0.1	-29.0	-6.5
AAS-01		10/17/2012	10:38	NA	NA	57	63	0.0	0.1	-28.0	-6.6
AAS-02		10/17/2012	11:32	NA	NA	63	63	0.0	0.1	-27.7	-11.0
FD-01 (CAS-01)		10/17/2012	9:15	57	58	45	58	0.0	0.0	-24.0	-7.0
FD-02 (AAS-01)		10/17/2012	10:38	NA	NA	57	63	0.0	0.1	-26.3	-7.4
TB-01		lab prep	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1. °F: degrees Fahrenheit
2. PID: photoionization detector
3. ppm: parts per million
4. Hg: mercury
5. NA: not applicable

Prepared By: SEK 12/10/12
Checked By: LRG 12/12/12

TABLE 2
Summary of Laboratory Analytical Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
AMEC Project 6252-12-0006

CRAWLSPACE/BASEMENT

Address	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
(b)(6)	CAS-01	0.67	0.14	<0.033	<0.0065
	FD-01	0.65	0.14	<0.036	<0.0071
	CAS-02	0.44	0.098	<0.035	0.022 J
	CAS-03	0.29	0.073	<0.034	<0.0066

AMBIENT

Location	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
(b)(6)	AAS-01	0.62	0.15	<0.035	<0.0068
	FD-02	0.65	0.15	<0.033	<0.0065
West of residences	AAS-02	0.15	0.039 J	<0.036	<0.0070

Notes:
1. Concentrations are in micrograms per cubic meter ($\mu g/m^3$).
2. TCE = trichloroethene; cis-1,2-DCE = cis-1,2-dichloroethene; trans-1,2-DCE = trans-1,2-dichloroethene; VC = vinyl chloride
3. J - Concentration is estimated.
4. '<' - Constituent not detected above indicated laboratory reporting limit.

Prepared By: SEK 12/11/12
Checked By: LRG 12/11/12

TABLE 3
Summary of Previous and Current Air Sampling Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
AMEC Project 6252-12-0006

CRAWLSPACE

Location	Sample Date	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
(b)(6)	12/13/2007	MGSC01	0.865	0.151 J	<0.198	<0.128
	8/07/2008	MGSC01	1.15	<0.264	<0.264	<0.171
	10/18/2012	CAS-01	0.67	0.14	<0.040	<0.040
	12/12/2007	MGSC10	0.243 J	<0.198	<0.198	<0.128
	10/18/2012	CAS-03	0.29	0.073	<0.040	<0.040

AMBIENT

Location	Sample Date	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
nea (b)(6)	8/07/2008	MG01-AMB	0.989	<0.264	<0.264	<0.171
	10/18/2012	AAS-01	0.62	0.15	<0.042	<0.042
nea	12/12/2007	4502 Ambient	0.124 J	<0.198	<0.198	<0.128
west/upwind during 2012 sampling	10/18/2012	AAS-02	0.15	0.039 J	<0.043	<0.043

Notes:

1. Concentrations are in micrograms per cubic meter ($\mu g/m^3$).
2. TCE = trichloroethene; cis-1,2-DCE = cis-1,2-dichloroethene; trans-1,2-DCE = trans-1,2-dichloroethene; VC = vinyl chloride
3. J - Concentration is estimated.
4. '<' - Constituent not detected at or above indicated laboratory reporting limit.

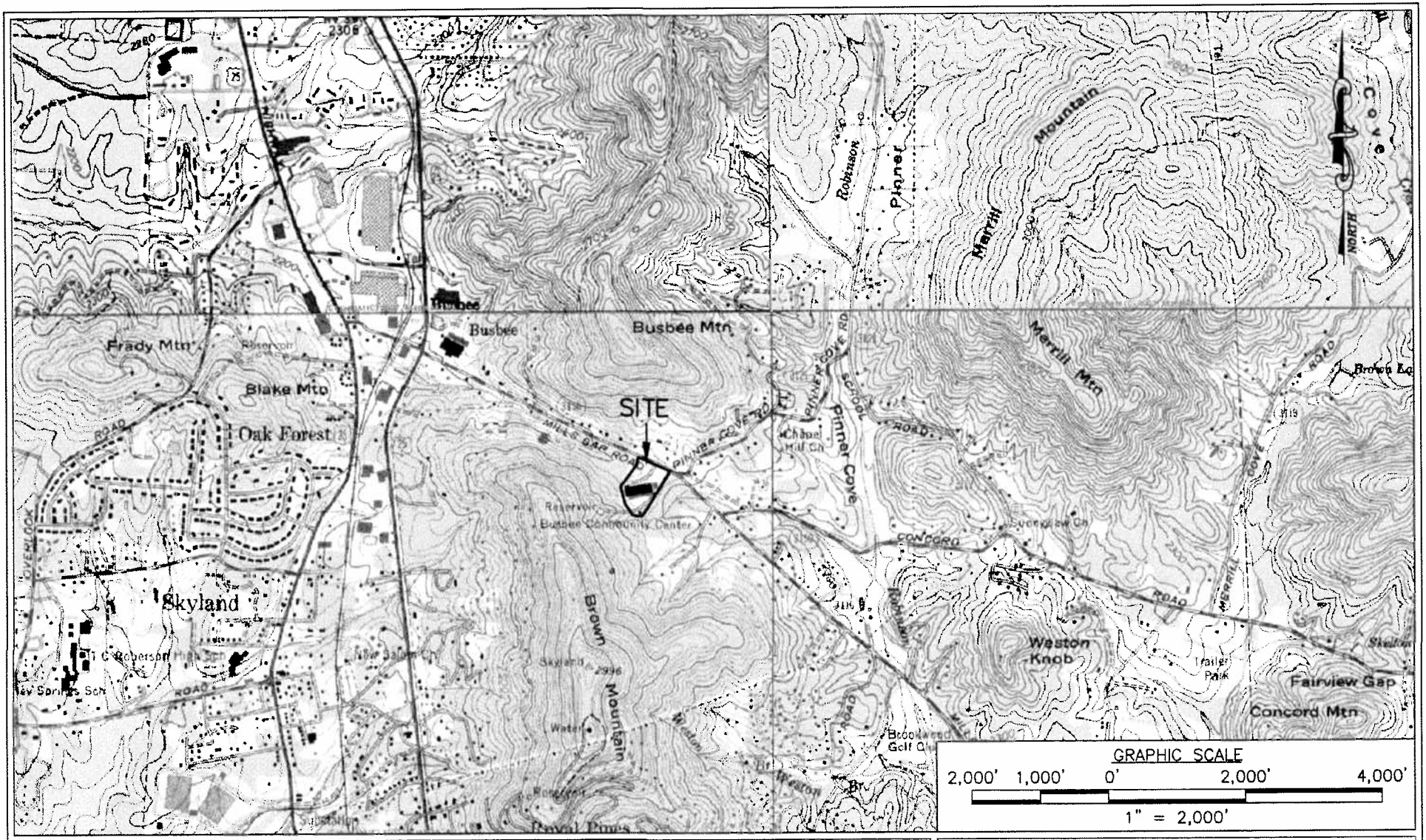
Prepared By: SEK 12/14/12
Checked By: MEW 12/14/12

TABLE 4
Summary of Risk to Indoor Air Concentrations
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
AMEC Project 6252-12-0006

Location	Adult		Child	
	Hazard Quotient	Excess Cancer Risk	Hazard Quotient	Excess Cancer Risk
(b)(6)	0.2	8E-07	0.2	2E-07
	0.2	1E-06	0.2	3E-07
	0.1	4E-07	0.1	1E-07
	0.3	2E-06	0.3	5E-07
Ambient Air AAS-02 (western common area)	0.07	3E-07	0.07	1E-07

Prepared By: LWC 12/07/12
Checked By: LMS 12/11/12

FIGURES

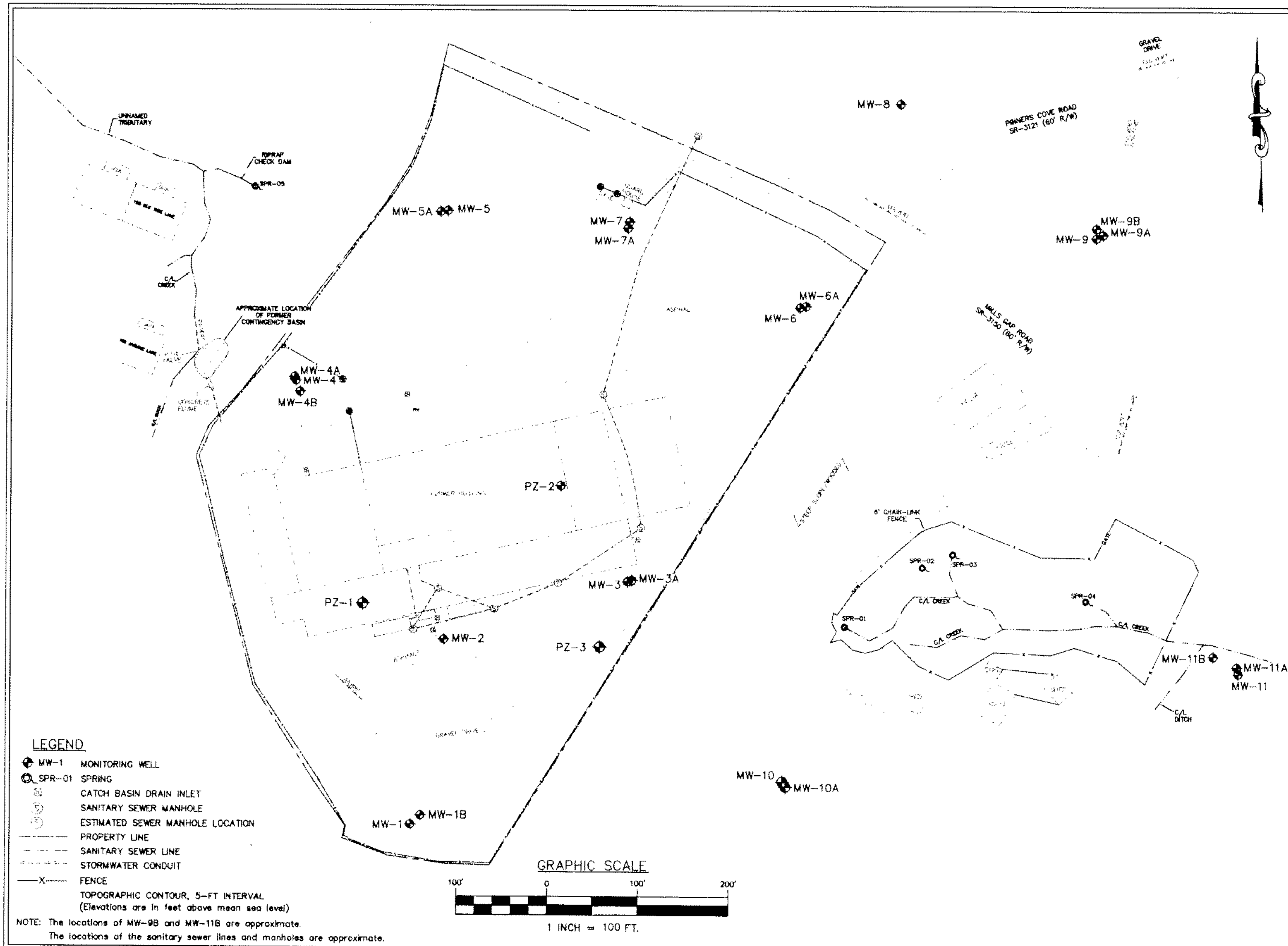


TOPOGRAPHIC SITE MAP
CTS OF ASHEVILLE, INC. SUPERFUND SITE
ASHEVILLE, NORTH CAROLINA

amec

DRAWN: SEK	ENG CHECK: --	DATE: DECEMBER 2012	PROJECT: 6252-12-0006
DFT CHECK: MEW	APPROVAL: MEW	SCALE: 1" = 2,000'	FIGURE: 1

REFERENCE: USGS QUADRANGLES: ASHEVILLE (1961), OTEEN (1962), FRUITLAND (1978) AND SKYLAND (1978)

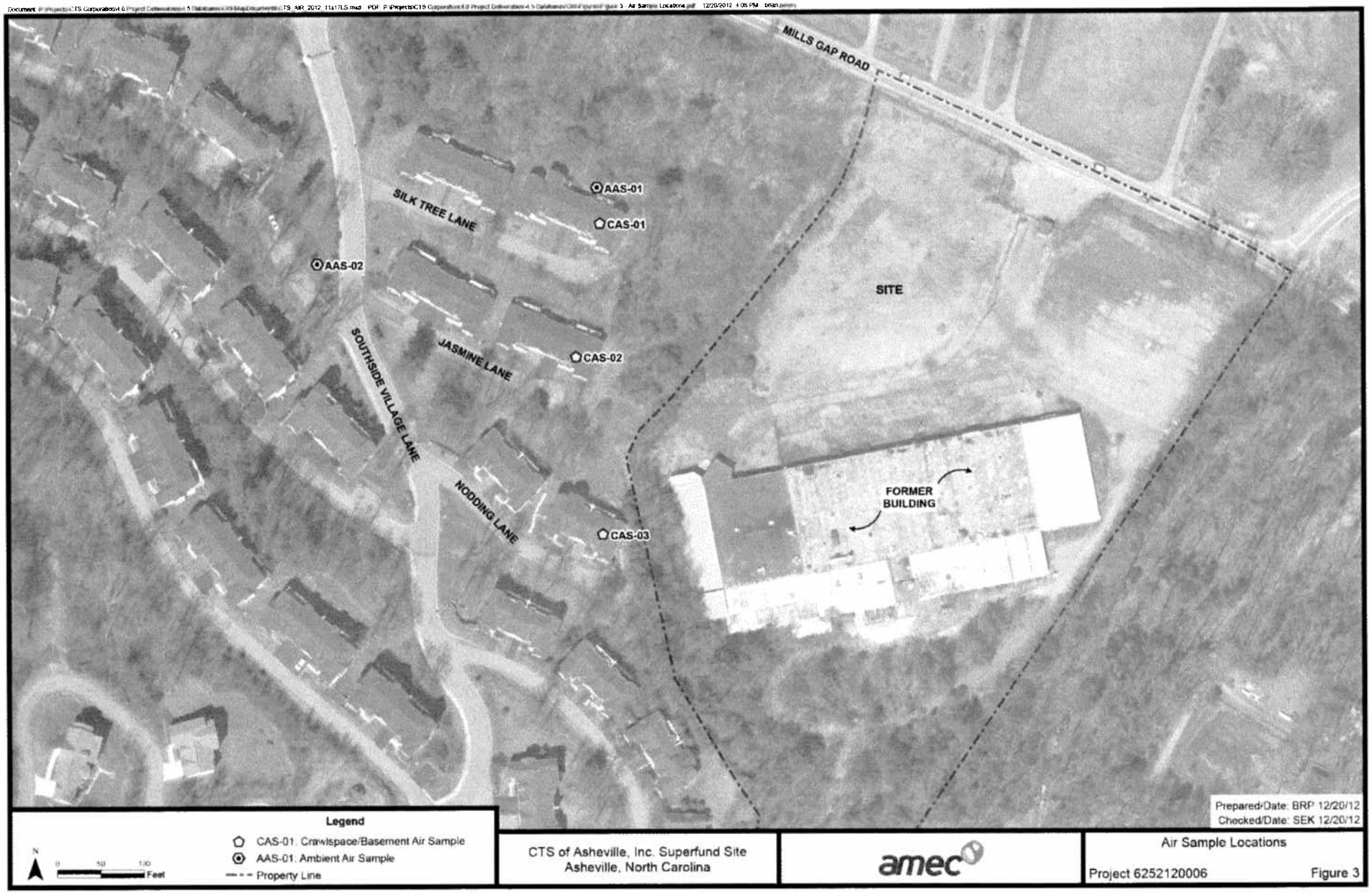


amec

SITE MAP
CTS OF ASHEVILLE, INC. SUPERFUND SITE
ASHEVILLE, NORTH CAROLINA

DRAWN: SEK	ENG CHECK: --	DATE: DECEMBER 2012	JOB: 6252-12-0006
DFT CHECK: MEW	APPROVAL: MEW	SCALE: 1"=100'	FIG: 2

REFERENCE: SURVEY PREPARED BY FREELAND & ASSOCIATES.



CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

amec

Air Sample Locations

Project 6252120006 Figure 3

APPENDIX A

ACCESS AGREEMENTS

(b)(6) S AUTHORIZATION

1. I, (b)(6), am the current owner, or authorized representative of the owner of Buncombe County land records parcel # 9655-62-1908-00000(b)(6) such I have the authority to sign this authorization.

2. I grant authorization to the U. S. Environmental Protection Agency (EPA) and its authorized representatives including, but not limited to, North Carolina Department of Environment and Natural Resources (NCDENR), and CTS Corporation to enter the property located at (b)(6) in Asheville, Buncombe County, North Carolina and conduct sampling activities inside my home. Authorized representatives also include officers, employees, contractors or other authorized representatives acting on the behalf of EPA, NCDENR and CTS for the purposes of these activities. Sampling activities on this property may include, but not be limited to, the following:

   a. the taking of air samples;

   b. transport of investigation equipment and short term securing and storage of investigative materials, as needed.

3. The consent for access and use granted herein will commence on the date of signature and will continue until EPA completes the evaluation and response action at the CTS of Asheville, Inc. Superfund Site, unless terminated earlier by the owner or authorized representative's written notification to EPA regarding the desire to terminate the authorization.

4. I have been notified that these actions by EPA are undertaken pursuant to its response authority under Section 104(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund), 42 U.S.C. Section 9604(a).

5. Please return this signed and dated Access Authorization to:

Samantha Urquhart-Foster
Remedial Project Manager
EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303

(b)(6) _____ 10 - 1 - 12
(Printed Name) (Date)

_____ (b)(6)
(Daytime Phone Number)

_____
(Title, if signing as authorized representative of owner)

_____
(Mailing address including City, State, and Zip Code)

[redacted]ESS AUTHORIZATION

1. [redacted], am the current owner, or authorized representative of the owner of Buncombe County land records parcel #9655-62-0888-00000 and as such I have the authority to sign this authorization.

2. I grant authorization to the U. S. Environmental Protection Agency (EPA) and its authorized representatives including, but not limited to, North Carolina Department of Environment and Natural Resources, (NCDENR), and CTS Corporation to enter the property located off of Mills Gap Road and conduct sampling activities. Authorized representatives also include officers, employees, contractors or other authorized representatives acting on the behalf of EPA, NCDENR and CTS for the purposes of these activities. This property is currently owned by Peter Waldburger, Trustee. Sampling activities on this property may include, but not be limited to, the following:

   a. the taking of soil, sediment, surface water, ground water and air samples as may be determined to be necessary;

   b. the sampling of any solids or liquids stored or disposed of on-site;

   c. the drilling of holes and installation of monitoring wells for subsurface investigation;

   d. transport of investigation equipment and short term securing and storage of investigative materials, as needed.

3. The consent for access and use granted herein will commence on the date of signature and will continue until EPA completes the investigative work and evaluation at the CTS of Asheville, Inc. Superfund Site.

4. I have been notified that these actions by EPA are undertaken pursuant to its response authority under Section 104(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund), 42 U.S.C. Section 9604(a).

5. Please return this signed and dated Access Authorization to:

Samantha Urquhart-Foster
Remedial Project Manager
EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.

Access Authorized for Individual Unit [redacted]

[redacted]
(Signature)

29 August 2012.
(Date)

[redacted]
(Printed Name)

[redacted]

(Title, if signing as authorized representative of owner)

(Mailing address including City, State, and Zip Code)

(b)(6) CESS AUTHORIZATION

1. I, (b)(6), am the current owner, or authorized representative of the owner of parcel #9655-62-0697-00000 and as such I have the authority to sign this authorization.

2. I grant authorization to the U. S. Environmental Protection Agency (EPA) and its authorized representatives including, but not limited to, North Carolina Department of Environment and Natural Resources, (NCDENR), and CTS Corporation to enter the property located off of Mills Gap Road and conduct sampling activities. Authorized representatives also include officers, employees, contractors or other authorized representatives acting on the behalf of EPA, NCDENR and CTS for the purposes of these activities. This property is currently owned by Raymond and Alana Powell. Sampling activities on this property may include, but not be limited to, the following:

   a. the taking of soil, sediment, surface water, ground water and air samples as may be determined to be necessary;

   b. the sampling of any solids or liquids stored or disposed of on-site;

   c. the drilling of holes and installation of monitoring wells for subsurface investigation;

   d. transport of investigation equipment and short term securing and storage of investigative materials, as needed.

3. The consent for access and use granted herein will commence on the date of signature and will continue until EPA completes the investigative work and evaluation at the CTS of Asheville, Inc. Superfund Site.

4. I have been notified that these actions by EPA are undertaken pursuant to its response authority under Section 104(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund), 42 U.S.C. Section 9604(a).

5. Please return this signed and dated Access Authorization to:

Samantha Urquhart-Foster
Remedial Project Manager
EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.

(b)(6)
(Signature)

8/20/12
(Date)

(b)(6)

(b)(6)
(Daytime Phone Number)

(Title, if signing as authorized representative of owner)

(b)(6) Asheville NC 28803
(Mailing address including City, State, and Zip Code)

ACCESS AUTHORIZATION

1. I, _____, am the current owner, or authorized representative of the owner of Buncombe County land records parcels #9655-62-0808-00000, #9655-52-9062-00000 and #9655-52-3990-00000 and as such I have the authority to sign this authorization.

2. I grant authorization to the U. S. Environmental Protection Agency (EPA) and its authorized representatives including, but not limited to, North Carolina Department of Environment and Natural Resources (NCDENR), and CTS Corporation to enter the property located off Mills Gap Road and conduct sampling activities. Authorized representatives also include officers, employees, contractors or other authorized representatives acting on the behalf of EPA, NCDENR and CTS for the purposes of these activities. This property is currently owned by Southside Village Association, Inc. Sampling activities on this property may include, but not be limited to, the following:

   a. the taking of soil, sediment, surface water, ground water and air samples as may be determined to be necessary;

   b. the sampling of any solids or liquids stored or disposed of on-site;

   c. the drilling of holes and installation of monitoring wells for subsurface investigation.

   d. transport of investigation equipment and short term securing and storage of investigative materials, as needed.

3. The consent for access and use granted herein will commence on the date of signature and will continue until EPA completes the evaluation and response action at the CTS of Asheville, Inc. Superfund Site, unless terminated earlier by the owner or authorized representative's written notification to EPA regarding the desire to terminate the authorization.

4. I have been notified that these actions by EPA are undertaken pursuant to its response authority under Section 104(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund), 42 U.S.C. Section 9604(a).

5. Please return this signed and dated Access Authorization to:

Samantha Urquhart-Foster
Remedial Project Manager
EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303

EACH PHASE OF TESTING TO BE PRECEDED BY A NEW REQUEST FOR AUTHORIZATION!

Ronald J. Karpola
(Signature)

18 SEP '12
(Date)

RONALD J. KARPOLA
(Printed Name)

828-684-8359
(Daytime Phone Number)

PRESIDENT SSVHOA
(Title, if signing as authorized representative of owner)

117 TRUMPET LN, ASHEVILLE, NC 28803
(Mailing address including City, State, and Zip Code)

ACCESS AUTHORIZATION

1. I, Terry J. Powell, am the current owner, or authorized representative of the owner of Buncombe County land records parcel #9655-53-7351-00000 and as such I have the authority to sign this authorization.

2. I grant authorization to the U. S. Environmental Protection Agency (EPA) and its authorized representatives including, but not limited to, North Carolina Department of Environment and Natural Resources, (NCDENR), and CTS Corporation to enter the property located off of Mills Gap Road and conduct sampling activities. Authorized representatives also include officers, employees, contractors or other authorized representatives acting on the behalf of EPA, NCDENR and CTS for the purposes of these activities. This property is currently owned by Duckett, Powell & Thompson Real Estate. Sampling activities on this property may include, but not be limited to, the following:

   a. the taking of soil, sediment, surface water, ground water and air samples as may be determined to be necessary;

   b. the sampling of any solids or liquids stored or disposed of on-site;

   c. the drilling of holes and installation of monitoring wells for subsurface investigation;

   d. transport of investigation equipment and short term securing and storage of investigative materials, as needed.

3. The consent for access and use granted herein will commence on the date of signature and will continue until EPA completes the investigative work and evaluation at the CTS of Asheville, Inc. Superfund Site.

4. I have been notified that these actions by EPA are undertaken pursuant to its response authority under Section 104(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund), 42 U.S.C. Section 9604(a).

5. Please return this signed and dated Access Authorization to:

Samantha Urquhart-Foster
Remedial Project Manager
EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303

Terry O-11 for Duckett-Powell et al Thomson — 8-24-12
(Signature) (Date)

Terry J. Powell — 828-231-1344
(Printed Name) (Daytime Phone Number)

President Duckett Powell et al Thomson
(Title, if signing as authorized representative of owner)

755 Biltmore Ave. Asheville, N.C. 28803
(Mailing address including City, State, and Zip Code)

APPENDIX B

OCCUPIED DWELLING QUESTIONNAIRES

OCCUPIED DWELLING QUESTIONNAIRE

Indoor Air Assessment Survey

Date: 10/16/12

1. Name: (b)(6)

   Addres

   Home Phone:_____ Work Phone:_____

2. What is the best time to call to speak with you?_____ At: Work ❑ or Home ❑?

3. Are you the Owner ☒, Renter ❑, Other ❑ (please specify)_____
   of this Home/Structure?

4. Total number of occupants/persons at this location? 1
   Number of children? no Ages? N/A

5. How long have you lived at this location? 2 yrs in 2/2013, so ~2.7 years

General Home Description

6. Type of Home/Structure (check only one): Single Family Home ❑, Duplex ☒,
   Condominium ❑, Townhouse ☒, Other ❑_____

7. Home/Structure Description: number of floors 1
   Basement? Yes ❑ No ☒
   Crawl Space? Yes ☒ No ❑
   If Yes, under how much of the house's area? ~80 %

8. Age of Home/Structure: 83 years, Not sure/Unknown ❑

9. General Above-Ground Home/Structure construction (check all that apply):
   Wood ☒, Brick ❑, Concrete ❑, Cement block ☒, Other ❑_____

10. Foundation Construction (check all that apply): ↳ crawlspace
    Concrete slab ❑
    Fieldstone ❑
    Concrete block ☒

Elevated above ground/grade ❑
Other _____

11. What is the source of your drinking water (check all that apply)?
Public water supply ☒
Private well ❑
Bottled water ❑
Other, please specify _____

12. Do you have a private well for purposes other than drinking?
Yes ❑ No ☒
If yes, please describe what you use the well for: _____
_____

13. Do you have a septic system? Yes ❑ No ☒ Not used ❑ Unknown ❑

14. Do you have standing water outside your home (pond, ditch, swale)? Yes ☒ No ❑
- unnamed tributary north of residence
- drainage/tributary east of residence

crawlspace
~~Basement~~ Description, please check appropriate boxes.
If you do not have a basement go to question 23.

crawlspace
15. Is the ~~basement~~ finished ❑ or unfinished ☒?
crawlspace
16. If finished, how many rooms are in the ~~basement~~? N/A
How many are used for more than 2 hours/day? N/A
crawlspace
17. Is the ~~basement~~ floor (check all that apply) concrete ❑, tile ❑, carpeted ❑, dirt ☒, other ❑ (describe) vapor barrier (plastic sheeting) covering ~100% of crawlspace; small gaps at edges
18. Are the ~~basement~~ walls poured concrete ❑, cement block ☒, stone ❑, wood ❑, brick ❑, other ❑ crawlspace ?
crawlspace
19. Does the ~~basement~~ have a moisture problem (check one only)?
Yes, frequently (3 or more times/yr) ❑
Yes, occasionally (1-2 times/yr) ❑
Yes, rarely (less than 1 time/yr) ❑
No ☒

crawlspace
20. Does the ~~basement~~ ever flood (check one only)?
Yes, frequently (3 or more times/yr) ❑
Yes, occasionally (1-2 times/yr) ❑
Yes, rarely (less than 1 time/yr) ❑
No ☒

crawlspace
21. Does the ~~basement~~ have any of the following? (check all that apply) Floor cracks ❑, Wall cracks ❑, Sump ❑, Floor drain ❑, Other hole/opening in floor ❑
(describe) N/A

22. Are any of the following used or stored in the ~~basement~~ crawlspace (check all that apply) nothing stored in crawlspace
Paint ❑ Paint stripper/remover ❑ Paint thinner ❑
Metal degreaser/cleaner ❑ Gasoline ❑ Diesel fuel ❑ Solvents ❑ Glue ❑
Laundry spot removers ❑ Drain cleaners ❑ Pesticides ❑

23. Have you recently (within the last six months) done any painting or remodeling in your home? Yes ❑ No ☒
If yes, please specify what was done, where in the home, and what month:

_____

_____

24. Have you installed new carpeting in your home within the last year? Yes ☒ No ❑
If yes, when and where? master bedroom (east portion on main level)

25. Do you regularly use or work in a dry cleaning service (check only one box)?
Yes, use dry-cleaning regularly (at least weekly) ❑
Yes, use dry-cleaning infrequently (monthly or less) ❑
Yes, work at a dry cleaning service ❑
No ☑

26. Does anyone in your home use solvents at work?
Yes ❑ If yes, how many persons_____
No ☑ If no, go to question 28

27. If yes for question 26 above, are the work clothes washed at home? Yes ❑ No ❑

28. Where is the washer/dryer located?
Basement ❑
Upstairs utility room ❑
Kitchen ❑
Garage ❑
Use a Laundromat ❑
Other, please specify ❑ master bathroom (east, off master bedroom)

29. If you have a dryer, is it vented to the outdoors? Yes ☑ No ❑

30. What type(s) of home heating do you have (check all that apply)
Fuel type: Gas ☑, Oil ❑, Electric ❑, Wood ❑, Coal ❑, Other_____
Heat conveyance system:
Forced hot air ☑
Forced hot water ❑
Steam ❑
Radiant floor heat ❑
Wood stove ❑
Coal furnace ❑
Fireplace ☑
Other_____

31. Do you have air conditioning? Yes ☑ No ☐. If yes, please check the appropriate type(s)
Central air conditioning ☑
Window air conditioning unit(s) ☐
Other ☐, please specify _____

32. Do you use any of the following? Room fans ☐, Ceiling fans ☑, Attic fan ☐
Do you ventilate using the fan-only mode of your central air conditioning or forced air heating system? Yes ☐ No ☒

33. Has your home had termite or other pesticide treatment: Yes ☒ No ☐ Unknown ☐
If yes, please specify type of pest controlled, Terminex
and approximate date of service quarterly

34. Water Heater Type: Gas ☒, Electric ☐, By furnace ☐, Other
☐ _____
Water heater location: Basement ☐, Upstairs utility room ☐, Garage ☐, Other ☒ (please describe) crawlspace

35. What type of cooking appliance do you have? Electric ☐, Gas ☒, Other
☐ _____

36. Is there a stove exhaust hood present? Yes ☒ No ☐
Does it vent to the outdoors? Yes ☐ No ☒

37. Smoking in Home:
None ☒, Rare (only guests) ☐, Moderate (residents light smokers) ☐,
Heavy (at least one heavy smoker in household) ☐

38. If yes to above, what do they smoke?
Cigarettes ☐ Cigars ☐
Pipe ☐ Other ☐

39. Do you regularly use air fresheners? Yes ☐ No ☒

40. Does anyone in the home have indoor home hobbies of crafts involving: None ☒
Heating ☐, soldering ☐, welding ☐, model glues ☐, paint ☐, spray paint, wood finishing ☐, Other ☐ Please specify what type of hobby: _____
_____

41. General family/home use of consumer products (please circle appropriate): Assume that **Never** = never used, **Hardly ever** = less than once/month, **Occasionally** = about once/month, **Regularly** = about once/week, and **Often** = more than once/week.

Product	Frequency of Use				
Spray-on deodorant	(Never)	Hardly ever	Occasionally	Regularly	Often

Aerosol deodorizers	Never	(Hardly ever)	Occasionally	Regularly	Often
Insecticides	Never	Hardly ever	Occasionally	Regularly	Often

↳ quarterly pest control; otherwise never

Disinfectants	Never	Hardly ever	(Occasionally)	Regularly	Often

(Question 41, continued)

Product	Frequency of Use				
Window cleaners	Never	Hardly ever	Occasionally	Regularly	Often

↳ professionally cleaned maximum 2 times per year

Spray-on oven cleaners	(Never)	Hardly ever	Occasionally	Regularly	Often
Nail polish remover	Never	(Hardly ever)	Occasionally	Regularly	Often
Hair sprays	Never	Hardly ever	(Occasionally)	Regularly	Often

42. Please check weekly household cleaning practices:
- Dusting ☒
- Dry sweeping ☒
- Vacuuming ☒
- Polishing (furniture, etc) ☒ (occassionally, not weekly)
- Washing/waxing floors ☐
- Other ☐ _____

43. Other comments: PID reading: 0.0ppm in crawlspace
0.4ppm in main level above crawlspace
- vents in cinder block wall of crawlspace (north and east)
- central vaccuum system

OCCUPIED DWELLING QUESTIONNAIRE

Indoor Air Assessment Survey

Date: 16 Oct 2012

1. Name: (b)(6)

   Addre:

   ASHEVILLE NC 28803

   Home Phone: (b)(6) Work Phone: _____

2. What is the best time to call to speak with you? 9-5 At: Work ☐ or Home ☒?

3. Are you the Owner ☒, Renter ☐, Other ☐ (please specify) _____ of this Home/Structure?

4. Total number of occupants/persons at this location? 2
   Number of children? NA Ages? NA

5. How long have you lived at this location? 8 (2004 - current)

General Home Description

6. Type of Home/Structure (check only one): Single Family Home ☐, Duplex ☒, Condominium ☐, Townhouse ☒, Other ☐ duplex

7. Home/Structure Description: number of floors 2
   Basement? Yes ☒ No ☐
   Crawl Space? Yes ☐ No ☒
   If Yes, under how much of the house's area? 100% (basement)

8. Age of Home/Structure: 9 years, Not sure/Unknown ☐ (2003 -)

9. General Above-Ground Home/Structure construction (check all that apply):
   Wood ☒, Brick ☒, Concrete ☐, Cement block ☒, Other ☒ VINYL → exterior

10. Foundation Construction (check all that apply):
    Concrete slab ☒ - "slab-on-grade"
    Fieldstone ☐
    Concrete block ☒

Elevated above ground/grade ☒
Other_____

11. What is the source of your drinking water (check all that apply)?
Public water supply ☒
Private well ☐
Bottled water ☐
Other, please specify _____

12. Do you have a private well for purposes other than drinking?
Yes ☐ No ☒
If yes, please describe what you use the well for:_____
_____

13. Do you have a septic system? Yes ☐ No ☒ Not used ☐ Unknown ☐

14. Do you have standing water outside your home (pond, ditch, swale)? Yes ☐ No ☐
DRAINAGE CREEK ALONGSIDE PROPERTY / FORMER GTS POND ALWAYS DAMP ALONG BACK OF HOUSE.

Basement Description, please check appropriate boxes.
If you do not have a basement go to question 23.

15. Is the basement finished ☒ or unfinished ☒? BOTH 50/50
16. If finished, how many rooms are in the basement? 3 + BATH
How many are used for more than 2 hours/day? 1
17. Is the basement floor (check all that apply) concrete ☒, tile ☒, carpeted ☒, dirt ☐, other ☒ (describe) ENGINEERED WOOD ? MAIN ROOM
18. Are the basement walls poured concrete ☐, cement block ☒, stone ☐, wood ☒, brick ☐, other ☒ VINYL OUTSIDE SHEET ROCK INSIDE ?
19. Does the basement have a moisture problem (check one only)?
Yes, frequently (3 or more times/yr) ☐
Yes, occasionally (1-2 times/yr) ☐
Yes, rarely (less than 1 time/yr) ☒ dehumidifier used
No ☐

20. Does the basement ever flood (check one only)?
Yes, frequently (3 or more times/yr) ☐
Yes, occasionally (1-2 times/yr) ☐
Yes, rarely (less than 1 time/yr) ☐
No ☒

21. Does the basement have any of the following? (check all that apply) Floor cracks ☒, Wall cracks ☐, Sump ☐, Floor drain ☒, Other hole/opening in floor ☐
(describe) IN FURNACE ROOM.

22. Are any of the following used or stored in the basement (check all that apply)
Paint ☒ Paint stripper/remover ☒ Paint thinner ☒
Metal degreaser/cleaner ☐ Gasoline ☐ Diesel fuel ☐ Solvents ☒ Glue ☒
Laundry spot removers ☐ Drain cleaners ☐ Pesticides ☐
- removed from residence within last month

23. Have you recently (within the last six months) done any painting or remodeling in your home? Yes ☒ No ☐
If yes, please specify what was done, where in the home, and what month:
REPAINT REMODEL INTERIOR 2011

24. Have you installed new carpeting in your home within the last year? Yes ☒ No ☐
If yes, when and where? 2011 (NOV) MBR & STAIRS (Level 2)

25. Do you regularly use or work in a dry cleaning service (check only one box)?
Yes, use dry-cleaning regularly (at least weekly) ☐
Yes, use dry-cleaning infrequently (monthly or less) ☒ 1-2 x/yr
Yes, work at a dry cleaning service ☐
No ☐

26. Does anyone in your home use solvents at work?
Yes ☒ If yes, how many persons 1 (as HOBBY)
No ☐ If no, go to question 28

27. If yes for question 26 above, are the work clothes washed at home? Yes ☒ No ☐

28. Where is the washer/dryer located?
Basement ☐
Upstairs utility room ☒ Level 2 (main)
Kitchen ☐
Garage ☐
Use a Laundromat ☐
Other, please specify ☐ _____

29. If you have a dryer, is it vented to the outdoors? Yes ☒ No ☐

30. What type(s) of home heating do you have (check all that apply)
Fuel type: Gas ☒, Oil ☐, Electric ☒, Wood ☐, Coal ☐, Other _____
Heat conveyance system:
Forced hot air ☒
Forced hot water ☐
Steam ☐
Radiant floor heat ☐
Wood stove ☐
Coal furnace ☐
Fireplace ☒ gas
Other ELEC. HEATER (PORTABLE)

31. Do you have air conditioning? Yes ☒ No ☐. If yes, please check the appropriate type(s)
Central air conditioning ☒
Window air conditioning unit(s) ☐
Other ☐, please specify _____

32. Do you use any of the following? Room fans ☒, Ceiling fans ☒, Attic fan ☐
Do you ventilate using the fan-only mode of your central air conditioning or forced air heating system? Yes ☐ No ☒

33. Has your home had termite or other pesticide treatment: Yes ☒ No ☐ Unknown ☐
If yes, please specify type of pest controlled, SPIDERS, ANTS, BEES, BUGS
and approximate date of service QUARTERLY ALSO TERMITE CHECK UPS

34. Water Heater Type: Gas ☒, Electric ☐, By furnace ☐, Other ☐ _____
Water heater location: Basement ☒, Upstairs utility room ☐, Garage ☐, Other ☐ (please describe) _____

35. What type of cooking appliance do you have? Electric ☐, Gas ☒, Other ☐ _____

36. Is there a stove exhaust hood present? Yes ☒ No ☐
Does it vent to the outdoors? Yes ☒ No ☐

37. Smoking in Home:
None ☒ Rare (only guests) ☐, Moderate (residents light smokers) ☐,
Heavy (at least one heavy smoker in household) ☐

38. If yes to above, what do they smoke?
Cigarettes ☐ Cigars ☐
Pipe ☐ Other ☐

39. Do you regularly use air fresheners? Yes ☐ No ☒

40. Does anyone in the home have indoor home hobbies of crafts involving: None ☐
Heating ☐, soldering ☐, welding ☐, ~~model~~ glues ☒, paint ☒, ~~spray paint,~~ N/A
wood finishing ☒, Other ☐ Please specify what type of hobby: FURNITURE REPAIR,
_____

41. General family/home use of consumer products (please circle appropriate): Assume that **Never** = never used, **Hardly ever** = less than once/month, **Occasionally** = about once/month, **Regularly** = about once/week, and **Often** = more than once/week.

Product	Frequency of Use				
Spray-on deodorant	Never	Hardly ever	Occasionally	Regularly	(Often)

Aerosol deodorizers	(Never)	Hardly ever	Occasionally	Regularly	Often
Insecticides (pest control contractor)	Never	(Hardly ever) QUARTERLY	Occasionally	Regularly	Often
Disinfectants	Never	Hardly ever	Occasionally	(Regularly)	Often

(Question 41, continued)

Product	Frequency of Use				
Window cleaners	Never	Hardly ever	Occasionally	(Regularly)	Often
Spray-on oven cleaners	(Never)	Hardly ever	Occasionally	Regularly	Often
Nail polish remover	Never	Hardly ever	(Occasionally)	Regularly	Often
Hair sprays	Never	(Hardly ever)	Occasionally	Regularly	Often

42. Please check weekly household cleaning practices:
Dusting ☒
Dry sweeping ☒
Vacuuming ☒
Polishing (furniture, etc) ☒
Washing/~~waxing floors~~ ☒
Other ☐ _____

43. Other comments: PID reading: 0.2 ppm (PID background reading fluctuating between 0.0 ppm & 0.3 ppm)
- Air exchanger lower level; turned off this morning (10/16/12)
- central vacuum system
- air exchange in "shop" (southeast corner of Level 1)
- unfinished portion of lower level (northern portion)
- exposed fiberglass insulation

(form completed by homeowner; additional clarifications entered by Susan Kelly of AMEC)

OCCUPIED DWELLING QUESTIONNAIRE

Indoor Air Assessment Survey

Date: 10/16/12

1. Name: (b)(6)

   Address: _____

   _____

   Home Phone: _____ Work Phone: _____

2. What is the best time to call to speak with you? _____ At: Work ☐ or Home ☐?

3. Are you the Owner ☒, Renter ☐, Other ☐ (please specify) _____ of this Home/Structure?

4. Total number of occupants/persons at this location? 1
   Number of children? no Ages? N/A

5. How long have you lived at this location? Since 2003

General Home Description

6. Type of Home/Structure (check only one): Single Family Home ☐, Duplex ☒, Condominium ☐, Townhouse ☒, Other ☐ _____

7. Home/Structure Description: number of floors 2
   Basement? Yes ☐ No ☒
   Crawl Space? Yes ☒ No ☐
   If Yes, under how much of the house's area? ~95 %

8. Age of Home/Structure: 9 years, Not sure/Unknown ☐

9. General Above-Ground Home/Structure construction (check all that apply):
   Wood ☒, Brick ☐, Concrete ☐, Cement block ☒, Other ☐ _____

10. Foundation Construction (check all that apply):
    Concrete slab ☐
    Fieldstone ☐
    Concrete block ☒

Elevated above ground/grade ☐
Other_____

11. What is the source of your drinking water (check all that apply)?
Public water supply ☒
Private well ☐
Bottled water ☐
Other, please specify _____

12. Do you have a private well for purposes other than drinking?
Yes ☐ No ☒
If yes, please describe what you use the well for:_____
_____

13. Do you have a septic system? Yes ☐ No ☒ Not used ☐ Unknown ☐

14. Do you have standing water outside your home (pond, ditch, swale)? Yes ☒ No ☐
drainage ditch to east of residence

crawlspace
~~Basement~~ **Description**, please check appropriate boxes.
If you do not have a basement go to question 23.

15. Is the ~~basement~~ crawlspace finished ☐ or unfinished ☒?
16. If finished, how many rooms are in the basement? N/A
How many are used for more than 2 hours/day? N/A
17. Is the ~~basement~~ crawlspace floor (check all that apply) concrete ☐, tile ☐, carpeted ☐, dirt ☒, other ☐ (describe) vapor/moisture barrier (polyethylene sheeting) covering ~90% of floor
18. Are the ~~basement~~ crawlspace walls poured concrete ☐, cement block ☒, stone ☐, wood ☐, brick ☐, other ☐ crawlspace?
19. Does the ~~basement~~ have a moisture problem (check one only)?
Yes, frequently (3 or more times/yr) ☐
Yes, occasionally (1-2 times/yr) ☐
Yes, rarely (less than 1 time/yr) ☐
No ☒

20. Does the ~~basement~~ crawlspace ever flood (check one only)?
Yes, frequently (3 or more times/yr) ☐
Yes, occasionally (1-2 times/yr) ☐
Yes, rarely (less than 1 time/yr) ☐
No ☒

21. Does the ~~basement~~ crawlspace have any of the following? (check all that apply) Floor cracks ☐, Wall cracks ☐, Sump ☐, Floor drain ☐, Other hole/opening in floor ☐
(describe) N/A

22. Are any of the following used or stored in the ~~basement~~ crawlspace (check all that apply)
Paint ☒ Paint stripper/remover ☐ Paint thinner ☐
Metal degreaser/cleaner ☐ Gasoline ☒ Diesel fuel ☐ Solvents ☐ Glue ☐
Laundry spot removers ☐ Drain cleaners ☐ Pesticides ☐
→ weed eater

23. Have you recently (within the last six months) done any painting or remodeling in your home? Yes ☐ No ☒
If yes, please specify what was done, where in the home, and what month:
_____
_____

24. Have you installed new carpeting in your home within the last year? Yes ☐ No ☒
If yes, when and where?_____

25. Do you regularly use or work in a dry cleaning service (check only one box)?
Yes, use dry-cleaning regularly (at least weekly) ☐
Yes, use dry-cleaning infrequently (monthly or less) ☐
Yes, work at a dry cleaning service ☐
No ☒

26. Does anyone in your home use solvents at work?
Yes ☐ If yes, how many persons_____
No ☒ If no, go to question 28

27. If yes for question 26 above, are the work clothes washed at home? Yes ☐ No ☐

28. Where is the washer/dryer located?
Basement ☐
Upstairs utility room ☐
Kitchen ☐
Garage ☐
Use a Laundromat ☐
Other, please specify ☒ Level 1

29. If you have a dryer, is it vented to the outdoors? Yes ☒ No ☐ (via crawlspace to northern wall)

30. What type(s) of home heating do you have (check all that apply)
Fuel type: Gas ☒, Oil ☐, Electric ☐, Wood ☐, Coal ☐, Other_____
Heat conveyance system:
Forced hot air ☒
Forced hot water ☐
Steam ☐
Radiant floor heat ☐
Wood stove ☐
Coal furnace ☐
Fireplace ☒
Other_____

31. Do you have air conditioning? Yes ☒ No ☐. If yes, please check the appropriate type(s)
Central air conditioning ☒ zoned: upstairs & downstairs
Window air conditioning unit(s) ☐
Other ☐, please specify _____

32. Do you use any of the following? Room fans ☐, Ceiling fans ☒, Attic fan ☐
Do you ventilate using the fan-only mode of your central air conditioning or forced air heating system? Yes ☐ No ☒

33. Has your home had termite or other pesticide treatment: Yes ☒ No ☐ Unknown ☐
If yes, please specify type of pest controlled, terminex
and approximate date of service ~August/September 2012

34. Water Heater Type: Gas ☒, Electric ☐, By furnace ☐, Other ☐ _____
Water heater location: Basement ☐, Upstairs utility room ☐, Garage ☐, Other ☐ (please describe) Level 1 (storage room)

35. What type of cooking appliance do you have? Electric ☐, Gas ☒, Other ☐ _____

36. Is there a stove exhaust hood present? Yes ☒ No ☐
Does it vent to the outdoors? Yes ☐ No ☒

37. Smoking in Home:
None ☒, Rare (only guests) ☐, Moderate (residents light smokers) ☐,
Heavy (at least one heavy smoker in household) ☐

38. If yes to above, what do they smoke?
Cigarettes ☐ Cigars ☐
Pipe ☐ Other ☐

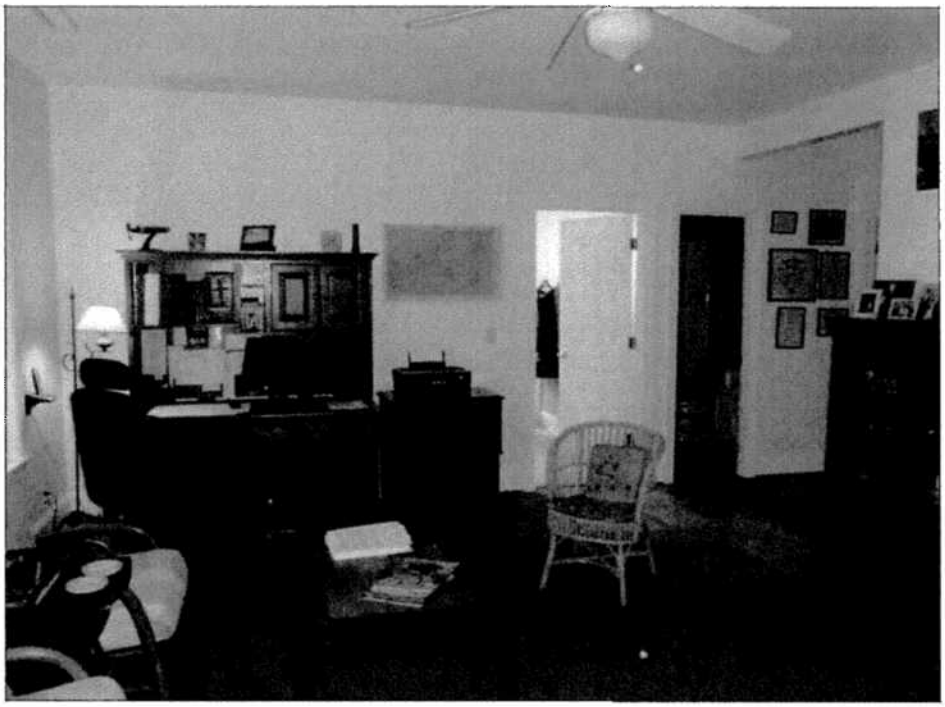
39. Do you regularly use air fresheners? Yes ☐ No ☒ (sometimes)

40. Does anyone in the home have indoor home hobbies of crafts involving: None ☒
Heating ☐, soldering ☐, welding ☐, model glues ☐, paint ☐, spray paint, wood finishing ☐, Other ☐ Please specify what type of hobby: _____

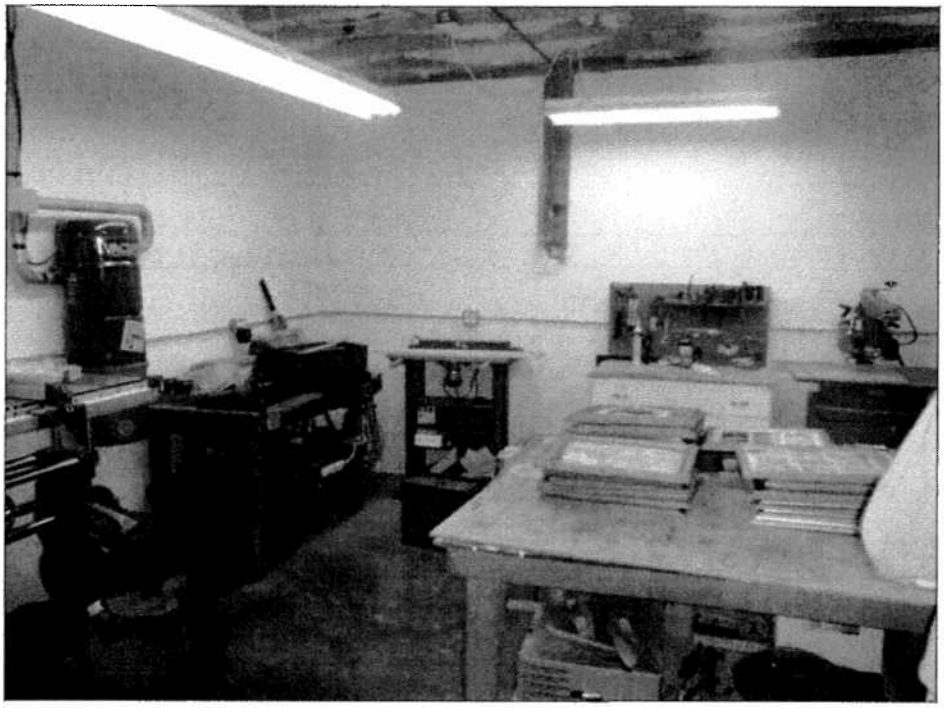
41. General family/home use of consumer products (please circle appropriate): Assume that **Never** = never used, **Hardly ever** = less than once/month, **Occasionally** = about once/month, **Regularly** = about once/week, and **Often** = more than once/week.

Product	Frequency of Use				
Spray-on deodorant	(Never)	Hardly ever	Occasionally	Regularly	Often

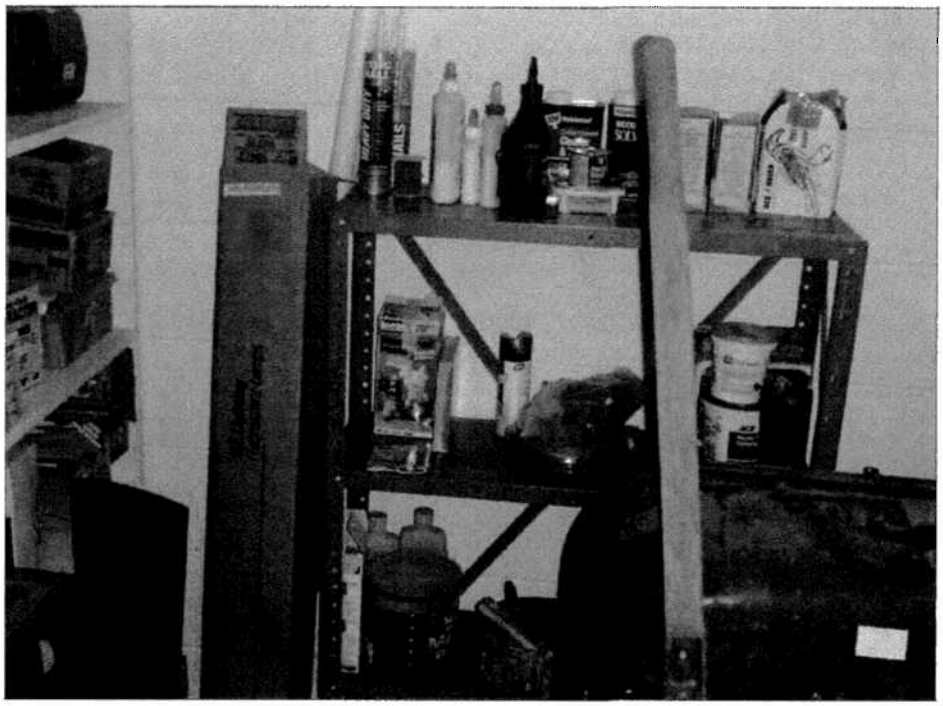
Photograph 5: View of northern exterior of (b)(6) note slab-on-grade construction of lower level finished basement).



Photograph 6: View of finished northern portion of basement at (b)(6)



Photograph 7: View of typical unfinished portion of basement at (b)(6) picture is of workshop room).

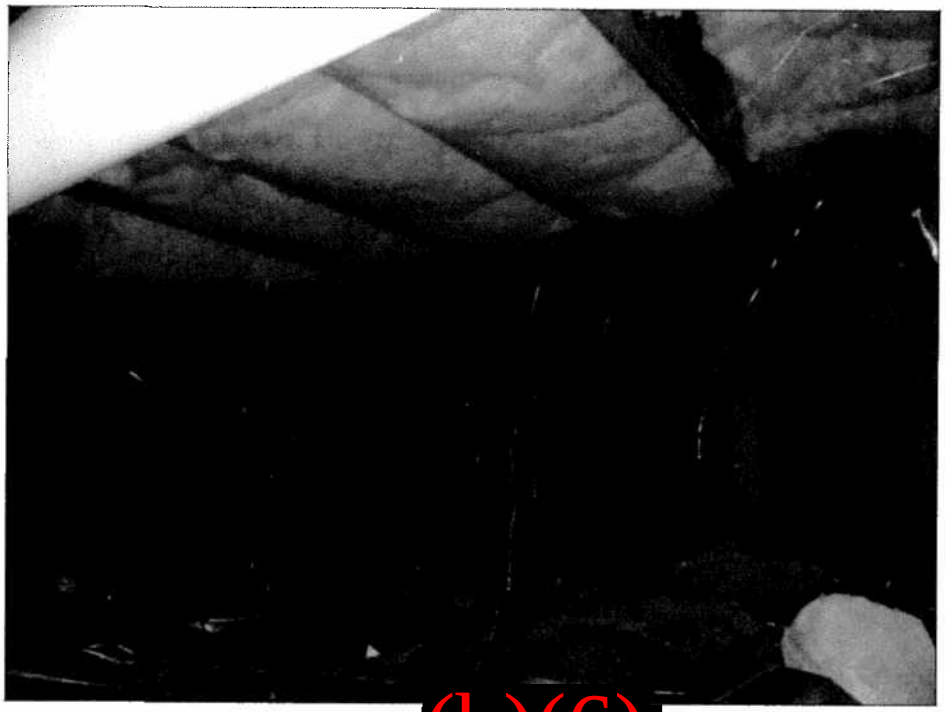


Photograph 8: View of furniture/wood repair/treatment supplies in basement at (b)(6)

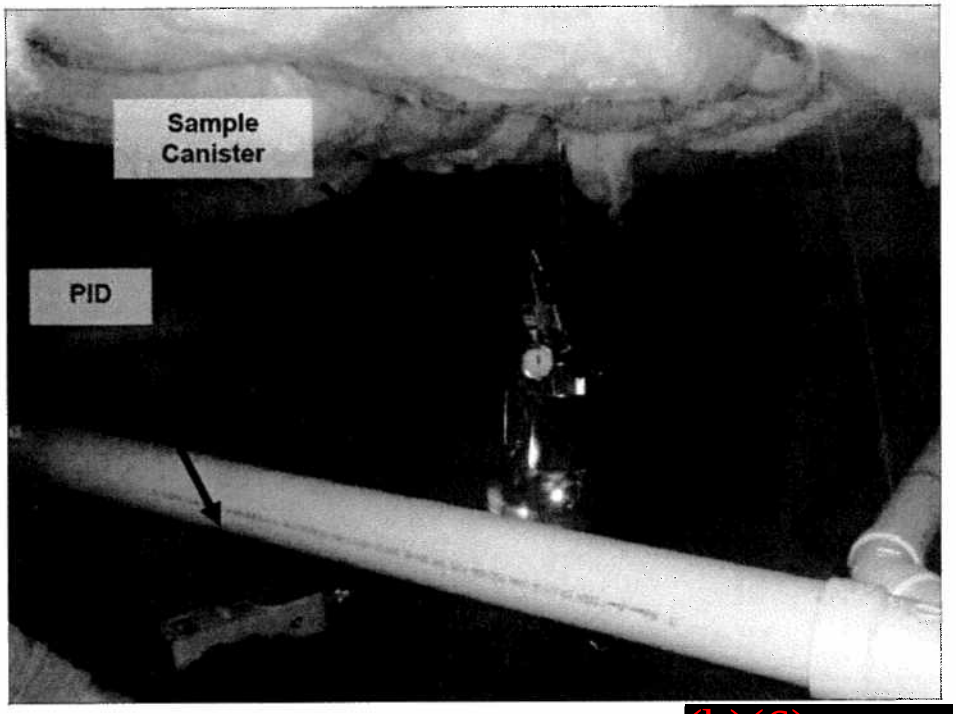
Photograph 9: View of paint supplies in basement at (b)(6)

Photograph 10: View sample canister (CAS-02) at (b)(6)

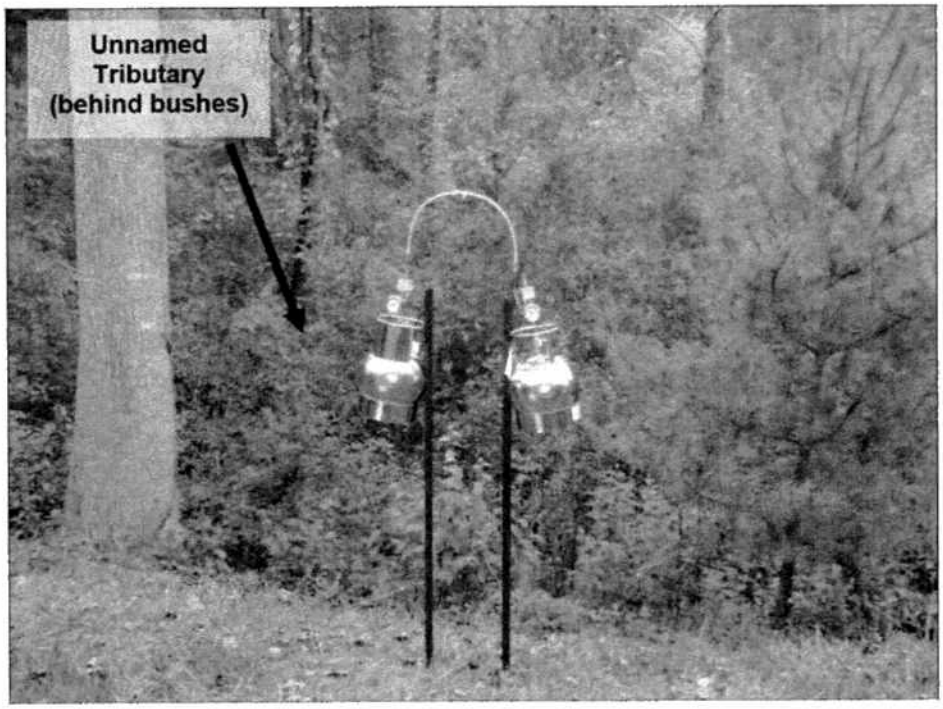
Photograph 11: View of northern exterior of (b)(6)



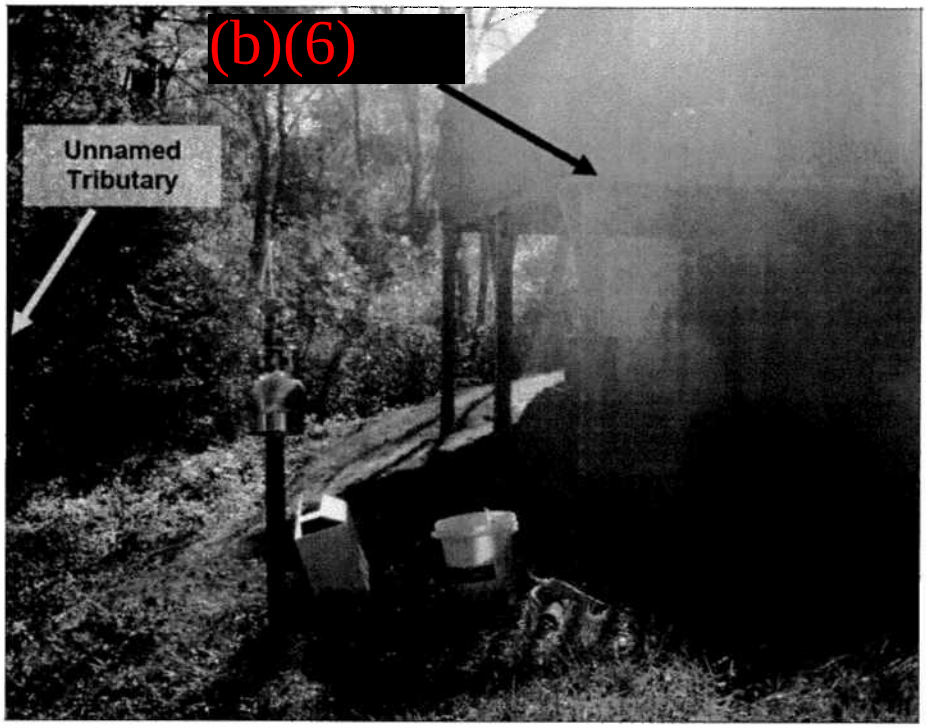
Photograph 12: View of crawlspace at (b)(6) (Note moisture barrier with areas o



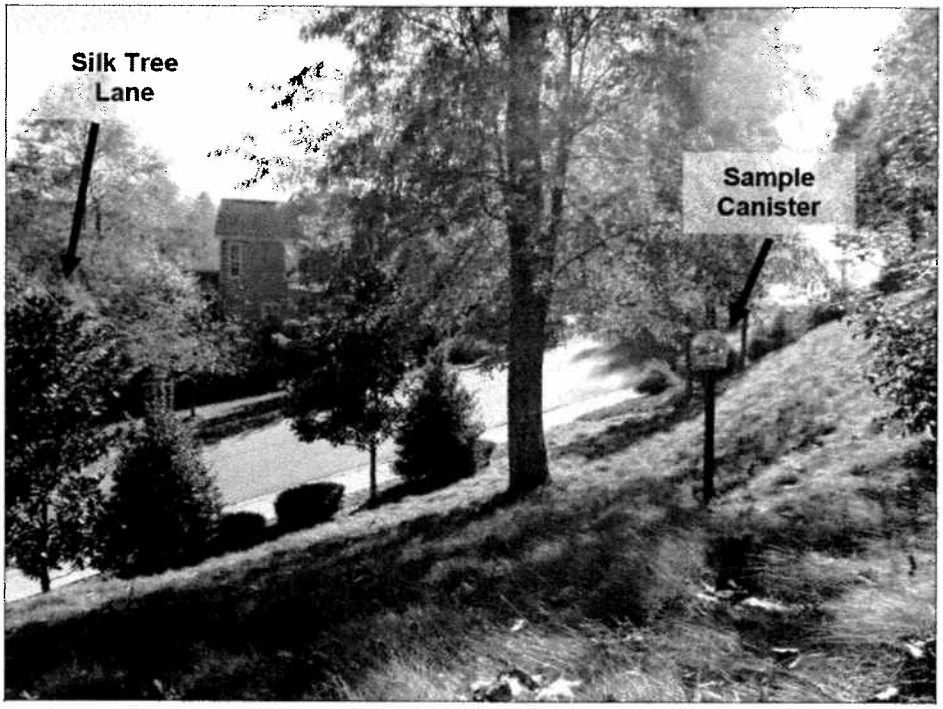
Photograph 13: View of sample canister (CAS-03) at (b)(6)



Photograph 14: View of ambient air sample (AAS-01 and FD-02).



Photograph 15: View of ambient air sample (AAS-01 and FD-02).



Photograph 16: View of ambient air sample AAS-02 (view is to the east).

APPENDIX D

LOGBOOK AND FIELD DATA RECORDS

Rite in the Rain
ALL-WEATHER WRITING PAPER

ALL-WEATHER
ENVIRONMENTAL FIELD BOOK

Name AMEC Environment & Infrastructure
c/o Susan Kelly
Address 1308 Patton Avenue
Asheville NC 28806
Phone 828-~~23~~ 252-8130

Project CTS of Asheville, Inc.
Superfund site

Rite in the Rain — A patented, environmentally responsible, all-weather writing paper that sheds water and enables you to write anywhere, in any weather. Using a pencil or all-weather pen, *Rite in the Rain* ensures that your notes survive the rigors of the field, regardless of the conditions.

Specifications for this book:

Page Pattern		Cover Options	
Left Page	Right Page	Polydura Cover	Fabrikoid Cover
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Location Asheville, NC Date 10/16/12

Project / Client UTS of Asheville, Inc. Superfund Site

162521.0006; S. Kelly (AMEC) P. 1/4

830 Arrive at Earthcare
- meet Ryan Stubbs (OTIE, representative of EPA
- Susan Kelly (AMEC)
- Jason Avritt (AMEC)
- discuss activities for the day to include:
  - inspect residences to be sampled for crawlspace air samples
  - inspect ambient air sample locations
- weather anticipated to be in the 60's F and clear/mild
- review HASP with Jason Avritt and Susan Kelly

855 - drive to (b)(6) [redacted]

900 - meet with homeowner at (b)(6) [redacted]

955 - calibrate PID (see FDR)

1005 - scan crawlspace with PID and determine location to collect crawlspace air sample (central portion of crawlspace)

Location Asheville, NC Date 10/16/12

Project / Client CTS of Asheville, Inc. Superfund site

6252120006 S.Kelly (AMEC) P. 2/4

1030 - to (b)(6)
- discuss Occupied Dwelling Questionnaire with homeowner (homeowner has already completed questionnaire)

1045 - (b)(6) arrives to discuss sampling activities
- schedule sampling for tomorrow (10/17/12) at 10:00am
- view lower level ("Level 1") of residence and exterior of north side (downslope) & east side of residence

1120 - leave residence at (b)(6)
- S.Kelly & J.Avritt go to lunch
- R.Stubbs go to lunch (separately)

1155 - S.Kelly and J Avritt drive to (b)(6)

1205 - R.Stubbs has already arrived
- discuss / complete Occupied Dwelling Questionnaire with homeowner
- view crawlspace and scan crawlspace with PID
- determine where to collect crawlspace air sample

Location Asheville, NC Date 10/16/12

Project / Client CTS of Asheville, Inc. Superfund site

6252120006 S.Kelly (AMEC) P. 3/4

1230 - leave (b)(6) residence
- S.Kelly, J.Avritt, and R.Stubbs identify location for ambient air sample to be collected between unnamed tributary north of (b)(6) & residence / structure itself.

1245 - leave South Side Village

1250 - receive phone call from Samantha Urquhart Foster indicating appointment time for (b)(6) residence is 1:15 pm today
- S.Kelly and J.Avritt to Lowes to purchase supplies for ambient air sample collection

1350 - S.Kelly and J.Avritt leave Lowes
- to office until next appointment

1830 - S.Kelly and J.Avritt leave office
- to Earthfare to meet R.Stubbs

1900 - at Earthfare and meet R.Stubbs

1910 - to residence at (b)(6) (b)(6)

1915 - arrive at (b)(6)

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Location Asheville, NC Date 10/16/12

Project / Client CTS of Asheville, Inc. Superfund Site

625212.0006 S.Kelly (AMEC) P. 4/4

1915 - complete 'Occupied Dwelling Questionnaire with homeowner
- homeowners mother (b)(6) arrives

1920 - (b)(6) arrives
- homeowner, (b)(6) and (b)(6) want samples collected in living area (not in crawlspace as approved by EPA)
- S.Kelly & R.Stubbs explain that we are not authorized to make changes to the EPA-approved Work Plan
- Mr. MacQueen begins discussing "history" of site with regard to EPA and CTS inaction/wrongdoing
- S.Kelly and R.Stubbs indicate they will inform EPA of their request to sample air in living space, and that no crawlspace samples will be collected at homeowners or tenants residences (b)(6) (b)(6)

1945 - leave residence 10/16/12
- Backnote: observe probable recording device at residence

17 10/17/12

Location Asheville, NC Date 10/~~16~~/12

Project / Client CTS of Asheville, Inc. Superfund Site

625212.0006 S.Kelly (AMEC) P. 1/3

8:30 - Susan Kelly (AMEC) and Jason Avritt (AMEC) arrive at Southside Village
- Ryan Stubbs (OTIE; representative of EPA) arrives
- R.Stubbs contacts homeowner at (b)(6) to open gate to neighborhood
- tailgate safety meeting with S.Kelly and J.Avritt

8:35 - at (b)(6) to set up ~~ambient~~ air sample AAS-01 ~~AAS-01~~ EA SD 10/17/12 between (b)(6) (b)(6) and unnamed tributary north of residence
- calibrate PID (see FDR)

850 - finish calibration
- due to scheduled time of 9:00 to deploy sample canisters at (b)(6), decide to deploy AAS-01 later.

900 - set up sample canister CAS-01
- also set up duplicate, FD-01

915 - begin sample collection at CAS-01/FD-01

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Location Asheville, NC Date 10/17/12

Project / Client GTS of Asheville, Inc. Superfund Site

625212000 S. Kelly (AMEC) P. 2/3

915 - take pictures of sample area and
- take temperature readings (indoor/crawl-space and outdoor) see FDR

925 - S. Kelly and J. Avritt to store for restroom break

935 - to (b)(6) ; next scheduled sample time is 10:00 at (b)(6)

945 - set up sample canister in basement/level 1 of (b)(6)

955 - begin [illegible] CAS-02

1000 - leave (b)(6) to (b)(6) (b)(6) to set up and deploy ambient air sample AAS-01 between (b)(6) an unnamed tributary north of (b)(6)
- set up AAS-01 and duplicate FD-02
- sample canisters deployed at 10:38
- take photographs, temperature

1045 - to (b)(6) to set up sample canister CAS-03
- set up CAS-03 in crawlspace of 108 Nodding Lane

1105 - begin sample collection of CAS-03
- take photographs, temperature

9

Location Asheville, NC Date 10/17/12

Project / Client GTS of Asheville, Inc Superfund site

625212000 S. Kelly (AMEC) P. 3/3

1110 - leave (b)(6) locate "upwind" ambient air sample location; there is a slight wind from the west, so identify location west of the crawlspace sample locations
- will locate sample west of main road (Southside Village Drive) in common area (see sketch on FDR)

11:32 - start sample collection at AAS-02
- take photographs, temperature

11:40 - S. Kelly and J. Avritt leave Southside Village
- R. Stubbs to leave momentarily

Donna Lee 10/17/12

*Note: observation from earlier: roads in Southside Village recently paved/topped (sealed with asphalt

10

Location Asheville, NC Date 10/18/12

Project / Client CTS of Asheville, Inc. Superfund Site

625212000 06 S. Kelly (AMEC) P. 1/2

8:30 - arrive at (b)(6)
- J. Avritt (AMEC) at residence
- Ryan Stubbs (OTIE) at residence
- tailgate safety meeting with J. Avritt and S. Kelly
- calibrate PID (see FDR)

8:50 - to crawlspace at (b)(6) (b)(6) and measure sample location with respect to crawlspace walls (AAS-01 and FD-01)

9:15 - close sample canisters and return to boxes for shipping
- to (b)(6) to retrieve sample

9:55 - turn off sample canister CAS-02

10:00 - leave (b)(6)
- to (b)(6) to retrieve ambient air sample AAS-01 and ~~FD-01~~ SK 10/9/12 FD-02

10:38 turn off sample canisters; remove canisters from posts and remove posts from ground SK 10/9/12
- place a pinstake/flag at ~~sample~~ sample location for surveying tomorrow

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Location Asheville, NC Date 10/18/12

Project / Client CTS of Asheville, Inc. Superfund Site

625212000 06 S. Kelly (AMEC) P. 2/2

10:50 - to (b)(6) to retrieve sample

11:05 - turn off sample canister CAS-03

11:15 - to common area to retrieve ambient air sample AAS-02 (PID reading 0.1 ppm background)

11:32 - turn off sample canister

11:35 - perform PID verification check. PID reading 91.1 ppm using 100 ppm isobutylene

11:40 R. Stubbs leaves Southside Village (going to Atlanta, GA)

11:45 S. Kelly and J. Avritt leave Southside Village (to office) (will pack samples at office and ship to Columbia Analytical Services in Simi Valley, CA; see chain-of-custody record)

10/18/12

12

Location Asheville, NC Date 10/22/12

Project / Client LTS of Asheville, Inc. Superfund Site

625212.0006 S. Kelly (AMEC) P. 1/2

1620 - Susan Kelly (AMEC) leaves from office to Southside village to survey/GPS air sample locations

1640 - at Southside Village and enter gate
- set up GPS equipment
- survey equipment test location at end of Silk Tree Lane (east end of drive at cul-de-sac)

1650 - survey the following locations in order
- AAS-01 (northo[redacted](b)(6)
- NE corner of [redacted](b)(6) as "CAS-0[redacted]
- NE corner of [redacted](b)(6) as "CAS-02[redacted]
- NE corner of [redacted](b)(6) as "CAS-03 offset)
- NW corner at deck of [redacted](b)(6) [redacted](b)(6) as "CAS-03 offset[redacted]
- SE corner of [redacted](b)(6) as "CAS-[redacted]
- AAS-02 (common space west of Southside Village Drive)

Location Asheville, NC Date 10/22/12 13

Project / Client LTS of Asheville, Inc. Superfund Site

625212.0006 S. Kelly (AMEC) P. 2/2

1715 - measure distances for CAS-03 offset 2 & 3 which were not collected adjacent to NE corner of residence (see FDR)

1730 - leave Southside Village for Fed Ex
- GPS antenna: Pine Env.: 15007
- GPS unit/receiver: Pine Env. 17763

1745 - at Fed Ex (Patton Avenue, Asheville)
- ship GPS equipment to AMEC Portland Maine office for download of data and upload to AMEC server

1800 - S. Kelly leaves Fed Ex

10/22/12

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville, Inc. Project Numer: 6252-12-0006.03

Sampling Personnel: S. Kelly & T. Avrit Sample ID: CAS-01

Sample Address: (b)(6) Sample Location*: crawlspace

Canister ID: AC.01447 Flow Controller ID: FCA.00343

Pressure gauge ID: AVG02390

	Start	Stop
Sample Date:	10/17/12	10/18/12
Sample Time:	9:15:00	9:15:00
Canister Pressure**:	-29.0 in Hg	-7.0 in Hg
Outdoor Temperature**:	45°F	58.4°F (digital thermometer)
Interior Temperature**:	57°F	57.5°F (digital thermometer)
PID Reading (ppm):	0.0	0.0
Wind Direction:	calm	calm

Antecedent weather conditions:

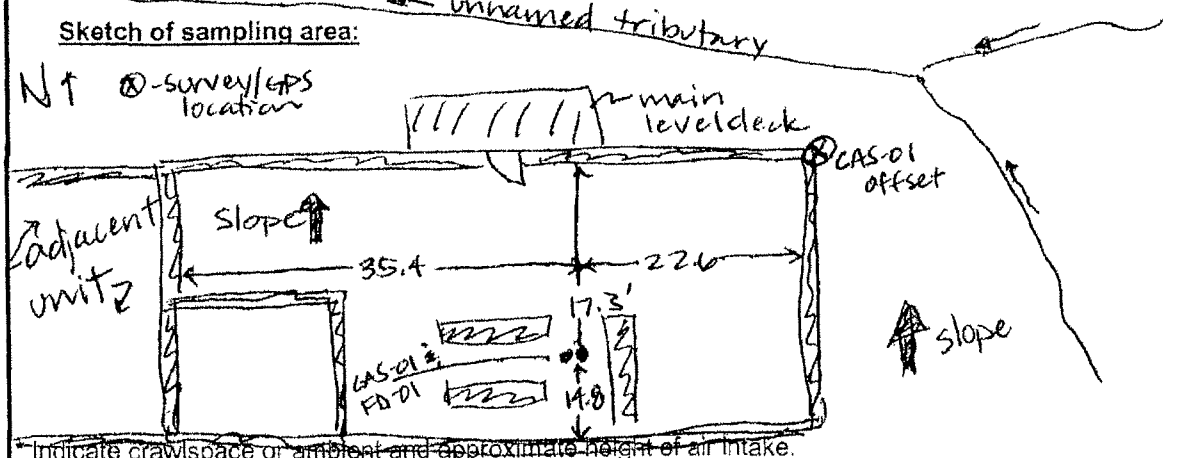
Sunny, clear, breezy, mid-60s°F on 10/16/12

Weather conditions during sample period:

mid-50s°F to mid-60s°F; storm front moved in overnight but no precipitation

Sample inlet height = 2.5ft

Sketch of sampling area:



* Indicate crawlspace or ambient and approximate height of air intake.

** Indicate unit of measurement.

NOT TO SCALE

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville, Inc. Project Numer: 6252-12-0006.03

Sampling Personnel: S. Kelly & J. Avritt Sample ID: CAS-02

Sample Address: (b)(6) Sample Location*: finished basement

Canister ID: AC01541 Flow Controller ID: FCA00007

Pressure gauge ID: AVG 01686

	Start	Stop
Sample Date:	10/17/12	10/18/12
Sample Time:	9:55:00	9:55:00
Canister Pressure**:	-29.4 in Hg	-8.0 in Hg
Outdoor Temperature**:	53°F	66.9°F (digital thermometer)
Interior Temperature**:	68°F	61.8°F (digital thermometer)
PID Reading (ppm):	0.1	0.2 (0.3 at time canister turned off)
Wind Direction:	Slight from west	calm

Antecedent weather conditions:

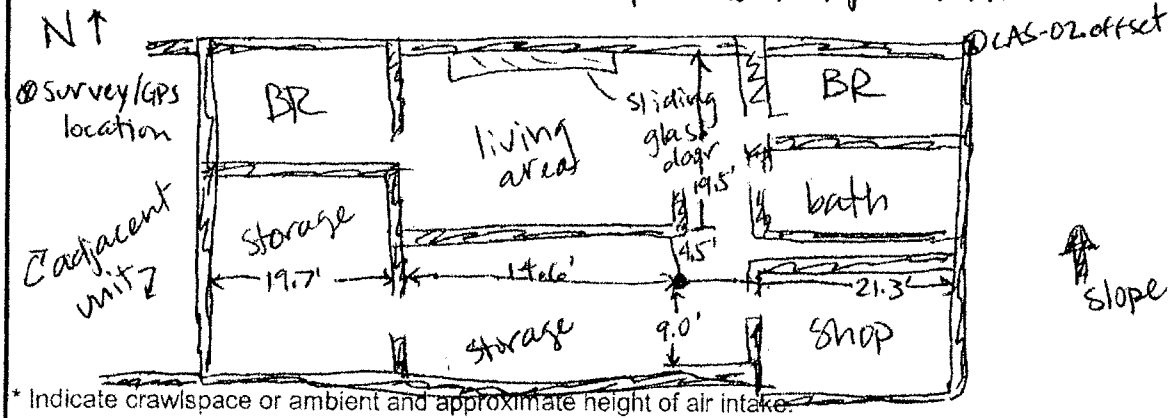
Sunny, clear, breezy, mid-60s°F on 10/16/12

Weather conditions during sample period: but no precipitation

mid-50s°F to mid-60s°F; storm front moved in overnight

*fan in living room on lower level is on (low speed)

Sketch of sampling area: sample inlet height = 1.7 ft.



* Indicate crawlspace or ambient and approximate height of air intake.

** Indicate unit of measurement.

NOT TO SCALE

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville, Inc. Project Numer: 6252-12-0006.03

Sampling Personnel: Skelly's, J.Avrit Sample ID: CAS-03

Sample Address: (b)(6) Sample Location*: crawlspace

Canister ID: AC00820 Flow Controller ID: FCA004446

Pressure gauge ID: AVG01862

	Start	Stop
Sample Date:	10/17/12	10/18/12
Sample Time:	11:05:00	11:05:00
Canister Pressure**:	-29.0 in Hg	-6.5 in Hg
Outdoor Temperature**:	55°F (shade)	62.6°F (digital thermometer)
Interior Temperature**:	59F	61.3°F (digital thermometer)
PID Reading (ppm):	0.0	0.1
Wind Direction:	Slight (from west)	Calm

Antecedent weather conditions:

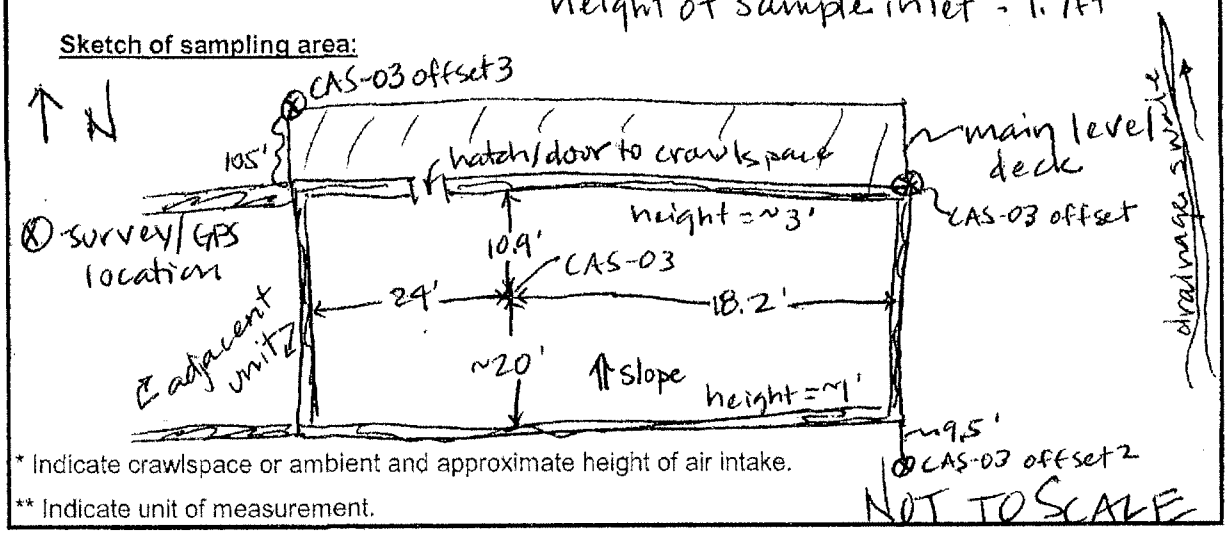
Sunny, clear, breezy, mid-60s°F on 10/16/12

Weather conditions during sample period:

mid-50s°F to mid-60s°F; storm front moved in overnight but no precipitation

height of sample inlet = 1.7ft

Sketch of sampling area:



* Indicate crawlspace or ambient and approximate height of air intake.

** Indicate unit of measurement.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville, Inc. Project Numer: 6252-12-0006.03

Sampling Personnel: S.Kelly & J.Avrett Sample ID: AAS-01

Sample Address: north of (b)(6) mple Location*: ambient

Canister ID: AC01939 Flow Controller ID: FCA00470

Pressure gauge ID: AVG01725

	Start	Stop
Sample Date:	10/17/12	10/18/12
Sample Time:	10:38:00	10:38:00
Canister Pressure**:	-28.0 in Hg	-6.6 in Hg
Outdoor Temperature**:	57°F	62.6°F (digital thermometer)
Interior Temperature**:	N/A	N/A
PID Reading (ppm):	0.0	0.1
Wind Direction:	slight from west	calm

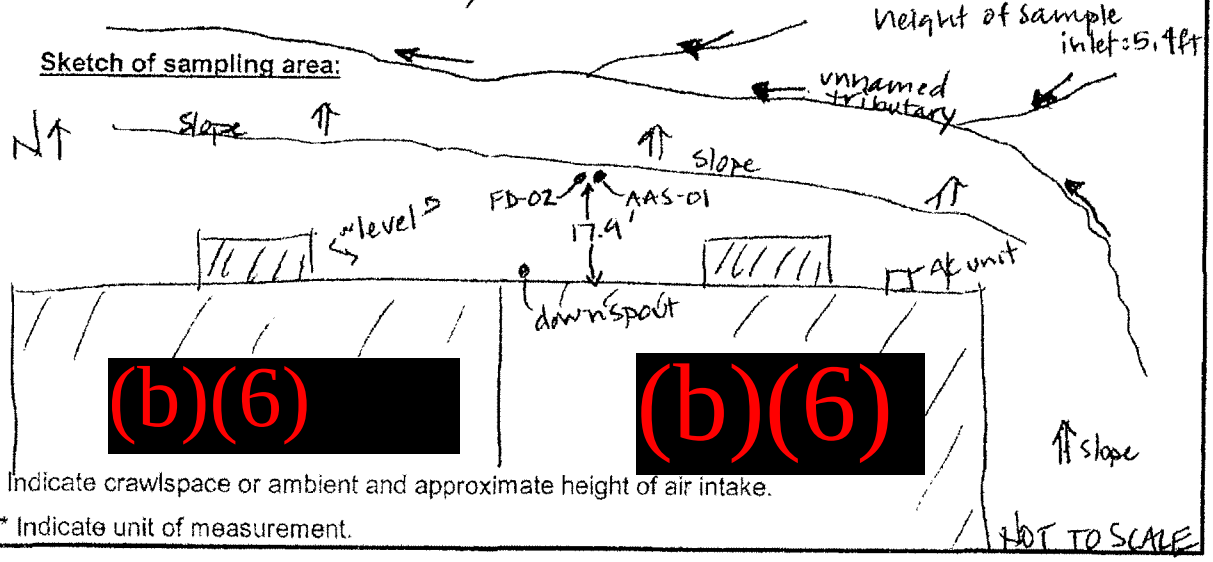
Antecedent weather conditions:

Sunny, clear, breezy, mid-60s°F on 10/16/12

Weather conditions during sample period: but no precipitation

mid-50s°F to mid-60s°F; storm front moved in overnight

Sketch of sampling area:



* Indicate crawlspace or ambient and approximate height of air intake.

** Indicate unit of measurement.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville, Inc. **Project Numer:** 6252-12-0006.03

Sampling Personnel: S. Kelly & T. Avritt **Sample ID:** AAS-02

Sample Address: Southside Village Common area **Sample Location*:** ambient/upwind

Canister ID: AC01763 **Flow Controller ID:** FCA00479

Pressure gauge ID: AVG01689

	Start	Stop
Sample Date:	10/17/12	10/18/12
Sample Time:	11:32:00	11:32:00
Canister Pressure:**	-27.7 in Hg	-11.0 in Hg
Outdoor Temperature:**	63°F	62.9°F (digital thermometer) 10/18/12
Interior Temperature:**	N/A	N/A
PID Reading (ppm):	0.0	0.1
Wind Direction:	slight from west	calm

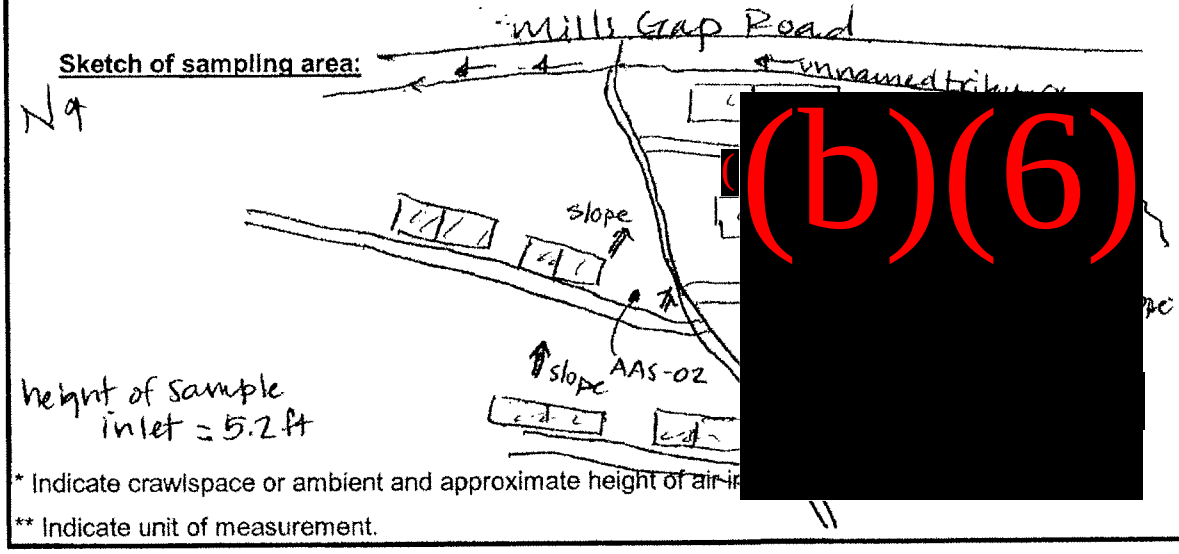
Antecedent weather conditions:

Sunny, clear, breezy, mid-60s°F on 10/16/12

Weather conditions during sample period:

mid-50s°F to mid-60s°F; storm front moved in overnight but no precipitation

Sketch of sampling area:



height of sample inlet = 5.2 ft

* Indicate crawlspace or ambient and approximate height of air in

** Indicate unit of measurement.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville, Inc. Project Numer: 6252-12-0006.03

Sampling Personnel: S. Kelly & J. Avrith Sample ID: FD-01

Sample Address: (b)(6) Sample Location*: crawlspace (CAS-01)

Canister ID: AC01225 Flow Controller ID: FCA00458

Pressure gauge ID: AVG01990

	Start	Stop
Sample Date:	10/17/12	10/18/12
Sample Time:	9:15:00	9:15:00
Canister Pressure**:	-24.0 in Hg	-7.0 in Hg
Outdoor Temperature**:	45°F	58.4°F (digital thermometer)
Interior Temperature**:	57°F	57.5°F (digital thermometer)
PID Reading (ppm):	0.0	0.0
Wind Direction:	calm	calm

Antecedent weather conditions:

Sunny, clear, breezy, mid-60s°F on 10/16/12

Weather conditions during sample period:

mid-50s to mid-60s°F; storm front moved in overnight, but no precipitation

Sketch of sampling area:

See CAS-01 sketch

* Indicate crawlspace or ambient and approximate height of air intake.

** Indicate unit of measurement.

AIR SAMPLING FIELD DATA RECORD

Project Name: CTS of Asheville, Inc. Project Numer: 6252-12-0006.03

Sampling Personnel: Skelly & J. Avrit Sample ID: FD-02 (10/17/12) 01

Sample Address: North of (b)(6) Sample Location*: ambient (AAS-02)

Canister ID: AC.00817 Flow Controller ID: FCA00279

Pressuregauge ID: AV G02489

	Start	Stop
Sample Date:	10/17/12	10/18/12
Sample Time:	10:38:00	10:38:00
Canister Pressure**:	-26.3 in Hg	-7.4 in Hg
Outdoor Temperature**:	57°F	62.6°F (digital thermometer)
Interior Temperature**:	N/A	N/A
PID Reading (ppm):	0.0	0.1
Wind Direction:	Slight (from west)	calm

Antecedent weather conditions:

Sunny, clear, breezy, mid-60s°F on 10/16/12

Weather conditions during sample period: but no precipitation

mid-50s°F to mid-60s°F; storm front moved in overnight

Sketch of sampling area:

See AAS-01 sketch

* Indicate crawlspace or ambient and approximate height of air intake.

** Indicate unit of measurement.

FIELD INSTRUMENT CALIBRATION RECORD

Project Name: CTS of Asheville, Inc. Superfund Site Date: 10/16/12

Project Number: 6252-12-0006.03 (Vapor Intrusion Assessment) Name: S. Kelly

Water Quality Meter Calibration		Standard Value		Meter Value		Acceptance Criteria
Manufacturer:	pH:		SU	pH:	SU	+/- 10% of standard
Model No.:	Conductivity:		mS/cm	Conductivity:	mS/cm	+/- 10% of standard
Unit ID:	Redox:		+/- mV	Redox:	+/- mV	see note 1
	DO:		mg/L *	DO:	mg/L	+/- 10% of standard
	Thermometer Temperature:		C°	Temperature:	C°	+/- 2.0 C°

Turbidity Meter Calibration	Standard Value		Meter Value		Acceptance Criteria
Manufacturer:		NTU (low)		NTU	+/- 10% of standard
Model No.:		NTU (med)		NTU	+/- 10% of standard
Unit ID:		NTU (high)		NTU	+/- 10% of standard

Photoionization Detector (rented from PineEnv.)

						Acceptance Criteria
Manufacturer: RAE	Background:	0.0	ppmv	Meter:	0.0	ppmv within 5 ppmv of Zero
Model No.: miniRAE 3000	Span Gas:	100	ppmv	Meter:	100.0	ppmv +/- 10% of standard
Unit ID: 20192						

Calibration Sources

	Source	Value		Lot Number	Expiration Date
pH			SU		
Conductivity			mS/cm		
Redox:			mV		
Turbidity (low)			NTU		
Turbidity (med):			NTU		
Turbidity (high):			NTU		
PID gas:	Isobutylene	100	ppmv	013110	8/2013
Other:					

NOTES:

* = Indicate in notes section what was used as the DO standard (i.e., based on saturation at room temperature)

** = If the meter reading is not within acceptance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the parameter was not calibrated to the acceptance criteria.

1 = meter must read within specified range of the Zobell solution (usually 231 +/- 10 mv).

FIELD INSTRUMENT CALIBRATION RECORD

Project Name: CTS of Asheville, Inc. Superfund Site Date: 10/17/12

Project Number: 6252-12-0006.03 (Vapor Intrusion Assessment) Name: Susan Kelly

Water Quality Meter Calibration	Standard Value		Meter Value		Acceptance Criteria
Manufacturer:	pH:	SU	pH:	SU	+/- 10% of standard
Model No.:	Conductivity:	mS/cm	Conductivity:	mS/cm	+/- 10% of standard
Unit ID:	Redox:	+/- mV	Redox:	+/- mV	see note 1
	DO:	mg/L *	DO:	mg/L	+/- 10% of standard
	Thermometer Temperature:	C°	Temperature:	C°	+/- 2.0 C°

Turbidity Meter Calibration	Standard Value		Meter Value		Acceptance Criteria
Manufacturer:		NTU (low)		NTU	+/- 10% of standard
Model No.:		NTU (med)		NTU	+/- 10% of standard
Unit ID:		NTU (high)		NTU	+/- 10% of standard

Photoionization Detector vented from Pine Environment.

							Acceptance Criteria
Manufacturer: RAE	Background:	0	ppmv	Meter:	0.0	ppmv	within 5 ppmv of Zero
Model No.: miniRAE 3000	Span Gas:	100	ppmv	Meter:	100.0	ppmv	+/- 10% of standard
Unit ID: 20192							

Calibration Sources

	Source	Value		Lot Number	Expiration Date
pH			SU		
Conductivity			mS/cm		
Redox:			mV		
Turbidity (low)			NTU		
Turbidity (med):			NTU		
Turbidity (high):			NTU		
PID gas:	isobutylene	100	ppmv	013110	8/2013
Other:					

NOTES:

* = Indicate in notes section what was used as the DO standard (i.e., based on saturation at room temperature)

** = If the meter reading is not within acceptance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the parameter was not calibrated to the acceptance criteria.

1 = meter must read within specified range of the Zobell solution (usually 231 +/- 10 mv).

FIELD INSTRUMENT CALIBRATION RECORD

Project Name: CTS of Asheville, Inc. Superfund Site Date: 10/18/12

Project Number: 6252-12-0006.03 (Vapor Intrusion Assessment) Name: S. Kelly

Water Quality Meter Calibration	Standard Value		Meter Value		Acceptance Criteria
Manufacturer: _____	pH: _____	SU	pH: _____	SU	+/- 10% of standard
Model No.: _____	Conductivity: _____	mS/cm	Conductivity: _____	mS/cm	+/- 10% of standard
Unit ID: _____	Redox: _____	+/- mV	Redox: _____	+/- mV	see note 1
	DO: _____	mg/L *	DO: _____	mg/L	+/- 10% of standard
	Thermometer Temperature: _____	C°	Temperature: _____	C°	+/- 2.0 C°

Turbidity Meter Calibration	Standard Value		Meter Value		Acceptance Criteria
Manufacturer: _____	_____	NTU (low)	_____	NTU	+/- 10% of standard
Model No.: _____	_____	NTU (med)	_____	NTU	+/- 10% of standard
Unit ID: _____	_____	NTU (high)	_____	NTU	+/- 10% of standard

Photoionization Detector						Acceptance Criteria
Manufacturer: RAE	Background:	0.0	ppmv	Meter:	0.0	ppmv within 5 ppmv of Zero
Model No.: Mini RAE 3000	Span Gas:	100	ppmv	Meter:	100.1	ppmv +/- 10% of standard
Unit ID: 20192						

Calibration Sources

	Source	Value		Lot Number	Expiration Date
pH	_____	_____	SU	_____	_____
Conductivity	_____	_____	mS/cm	_____	_____
Redox:	_____	_____	mV	_____	_____
Turbidity (low)	_____	_____	NTU	_____	_____
Turbidity (med):	_____	_____	NTU	_____	_____
Turbidity (high):	_____	_____	NTU	_____	_____
PID gas:	isobutylene	100	ppmv	013110	8/2013
Other:	_____	_____		_____	_____

NOTES:

* = Indicate in notes section what was used as the DO standard (i.e., based on saturation at room temperature)

** = If the meter reading is not within acceptance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the parameter was not calibrated to the acceptance criteria.

1 = meter must read within specified range of the Zobell solution (usually 231 +/- 10 mv).

Equipment Calibration Record for Asheville, NC Office
AMEC Environment Infrastructure

PCC-13 **CURING BOX HIGH/LOW THERMOMETERS**

IDENTIFICATION:

1. EQUIPMENT NAME: Field Thermometer (#123)
2. MANUFACTURE: Durham Geo
3. EQUIPMENT CONTROLLED BY: Asheville 6685

CALIBRATION:

4. CALIBRATION REFERENCE: PCC-13; ASTM C 31, C 1064
5. CALIBRATION FACILITY: Asheville Laboratory
6. TRACEABLE MEASURING AND TEST EQUIPMENT USED FOR CALIBRATION:

EQUIPMENT NAME	SERIAL OR ID NUMBER
Lab Therm (Glass)	69

7. CALIBRATION TABLE

	Standard Reading (°F)	"As Received" Reading (°F)	"As Received Deviation (°F)	"After Calibration" Reading (°F)	"After Calibration" Deviation (°F)	Tolerance[1]
Bath Temp 1 (70 F +/- 10 F)	68.9	69.0	—	—	—	+/- 1°F
Bath Temp 2 (at least 30 F more from Temp 1)	110.0	112.0	—	—	—	+/- 1°F
Bath Temp 3 (at least 30 F less than Temp 1)	37.4	38.0	—	—	—	+/- 1°F

RESULTS:

8. Equipment Status upon receipt: Conforms X Nonconforming*_____
   * Who Was Notified?_____ Corrective Action_____
9. Equipment Status After Adjustment: Conforms_____ Nonconforming_____
10. Calibration Performed By: JD Date: 10-15-12 Checked By: JH Date: 10/15/12
11. Calibration Freq. 6 MONTHS Previous Calibration Date: _____
12. Recalibration Due: 4-15-13 Sticker Applied By: JD Date: 10-15-12

Procedure: calibrated in air of temperatures within presumed opperational Range (e.g. refridgerator, room, oven)

Note (1): +/- 2 ° F is acceptable per procedure PCC-14 (ASTM Ref. C 511)

PHOTOGRAPH RECORD

Project Name: CTS of Asheville, Inc. Superfund Site **Project Number:** 6252-12-0006.03

Task/Activity: Vapor Intrusion Assessment **Personnel:** S. KELLY / J. AVRITT

File Name	Date	Time	Description
100-0002	10/16/12	09:14	SW CORNER OF CRAWL SPACE BELOW GARAGE
0003		09:15	SE NW CORNER OF CRAWL SPACE
0004		09:15	NE CORNER OF CRAWL SPACE
0005		09:16	CENTRAL CRAWL SPACE AREA
0007		09:32	BACK OF TOWNHOME
0008		09:38	UNFINISHED AREA BASEMENT SE CORNER
0009		09:38	UNFINISHED AREA BASEMENT S WALL
0010		09:42	STORAGE ROOM / W/ AC & HEATER
0011		09:43	STORAGE ROOM SOUTH WALL
0012		09:46	DOWNSTAIRS SITTING AREA EAST SIDE
0013		09:46	DOWNSTAIRS SITTING AREA WEST SIDE
0014		09:48	GARAGE
0015		10:11	NE CORNER OF CRAWL SPACE
0016	10/16/12	11:00	WORK SHOP AREA SE CORNER
0017		11:00	AIR EXCHANGER IN WORKSHOP AREA
0018		11:03	STORAGE AREA BASEMENT SW CORNER
0019		11:05	DOWNSTAIRS SITTING AREA NW CORNER
0020		11:06	DOWNSTAIRS SITTING AREA EAST SIDE
0021		11:10	STORAGE AREA BASEMENT
0022		11:11	STORAGE AREA BASEMENT
0023		11:13	EAST SIDE OF DUPLEX
0027		11:14	BACK OF DUPLEX
0028		11:18	BACK OF DUPLEX (SLAB ON GRADE)

(b)(6)

(b)(6)

PHOTOGRAPH RECORD

Project Name: CTS of Asheville, Inc. Superfund Site Project Number: 6252-12-0006.03

Task/Activity: Vapor Intrusion Assessment Personnel: S. KELLY / J. AVRITT

File Name	Date	Time	Description
0029	10/16/12	12:27	SE CORNER OF CRAWL SPACE AREA
0030		12:28	CENTRAL CRAWL SPACE AREA (SOUTH WALL)
0031		12:28	NW CORNER OF CRAWL SPACE AREA
0032		12:29	NE CORNER OF CRAWL SPACE AREA
0033		12:33	BACK OF DUPLEX
0034		12:33	EAST SIDE OF DUPLEX
0035	10/17/12	09:17	SAMPLE CAS-01/FD-01 START OF EVENT
0036		09:17	SAMPLE CAS-01/FD-01 START OF EVENT
0037		09:17	SAMPLE CAS-01/FD-01 START OF EVENT
0038		09:55	SAMPLE CAS-02 START OF EVENT
0039		09:55	SAMPLE CAS-02 START OF EVENT
0040		10:38	SAMPLE AAS-01/FD-02 START OF EVENT
0041		10:39	SAMPLE AAS-01/FD-02 PROCITY TO RESIDENCE
0042		10:40	SAMPLE AAS-01/FD-02 START OF EVENT
0043		11:04	SAMPLE CAS-03 START OF EVENT
0044		11:04	SAMPLE CAS-03 START OF EVENT
0045		11:06	SAMPLE CAS-03 START OF EVENT
0046		11:33	SAMPLE AAS-02 START OF EVENT
0047		11:33	SAMPLE AAS-02 START OF EVENT
0048	10/18/12	08:54	SAMPLE CAS-01/FD-01 END OF EVENT
0049		08:54	SAMPLE CAS-01/FD-01 END OF EVENT
0050		09:47	STORED PAINTS/FINISHES @ (b)(6)
0051		09:48	STORED PAINTS/FINISHES @ (b)(6)
0052		10:18	SAMPLE AAS-01/FD-02 END OF EVENT
0053		10:18	SAMPLE AAS-01/FD-02 END OF EVENT

(b)(6)

PHOTOGRAPH RECORD

Project Name: CTS of Asheville, Inc. Superfund Site Project Number: 6252-12-0006.03

Task/Activity: Vapor Intrusion Assessment Personnel: S. KELLY / J. AVRITT

File Name	Date	Time	Description
0054	10/18/12	10:43	LOCATION FLAG LEFT @ AAS-01/FD-02 FOR GPS
0055		11:25	SAMPLE AAS-02 END OF EVENT
0056		11:26	SAMPLE AAS-02 END OF EVENT
0057		11:27	LOCATION FLAG LEFT @ AAS-02 FOR GPS
0058		11:37	LOCATION FLAG AFTER CANISTER/POLE REMOVAL

APPENDIX E

LABORATORY INDIVIDUAL CERTIFATION DOCUMENTS

Columbia Analytical Services, INC.
An Employee - Owned Company

Individual Summa Canister and Combination Summa Canister/Flow Controller QC Check

Client: AMEC Environmental & Infrastructure, Inc.
Method: TO-15 SIM
Instrument: Tekmar AUTOCAN/Agilent 5973N/HP6890A/MS7
Analyte List: See below
MRL: 0.025ug/m3---->0.10ug/m3
Media Request: 34762

Canister	Flow Controller	Gauge	Date Analyzed	SIM QC
AC01225	FCA00343	AVG01990	10/10/12	PASS
AC00836	FCA00253	AVG02545	10/10/12	PASS
AC01447	FCA00458	AVG02390	10/10/12	PASS
AC01541	FCA00007	AVG01835	10/10/12	PASS
AC00820	FCA00446	AVG01686	10/10/12	PASS
AC00907	FCA00419	AVG02205	10/10/12	PASS
AC01057	FCA00324	AVG02350	10/10/12	PASS
AC00593	FCA00122	AVG01862	10/10/12	PASS
AC00817	FCA00279	AVG02489	10/10/12	PASS
AC01763	FCA00479	AVG01689	10/10/12	PASS

Analytes: VC, cis&trans-1,2-DCE, TCE

10/11/12 w

Columbia Analytical Services INC.
An Employee - Owned Company

Individual Summa Canister and Combination Summa Canister/Flow Controller QC Check

Client: AMEC Environmental & Infrastructure, Inc.
Method: TO-15 SIM
Instrument: Tekmar AUTOCAN/Agilent 5973N/HP6890A/MS7
Analyte List: See below
MRL: 0.025ug/m3---->0.10ug/m3
Media Request: 34762

Canister	Flow Controller	Gauge	Date Analyzed	SIM QC
AC01939	FCA00470	AVG01725	10/8/12	PASS
AS00260	FCA00340	AVG02649	10/8/12	PASS
AC01948	FCA00561	AVG02054	10/8/12	PASS
AS00232	FCA00342	AVG02065	10/8/12	PASS
AS00267	FCA00490	AVG02653	10/8/12	PASS
AC01074	FCA00311	AVG02622	10/8/12	PASS
AS00195	FCA00447	AVG02257	10/8/12	PASS

Analytes: VC, cis&trans-1,2-DCE, TCE

10/10/12 u

Columbia Analytical Services INC.
An Employee - Owned Company

Individual Summa Canister QC Check

Client: AMEC Environmental & Infrastructure, Inc.
Method: TO-15
Instrument: HP5972A/HP5890 II/MS11
Analyte List: See below
MRL: 0.025ug/m3---->0.10ug/m3
Media Request: 34762

Canister	Gauge	Date Analyzed	SIM QC
	DVG00115	10/12/12	PASS
	DVG00091	10/12/12	PASS

Analytes: VC, cis&trans-1,2-DCE, TCE

10/12/12

APPENDIX F

LABORATORY ANALYTICAL REPORT

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LABORATORY REPORT

December 21, 2012

Susan Kelly
AMEC Environment & Infrastructure, Inc.
1308-C Patton Ave
Asheville, NC 28806-2604

RE: CTS of Asheville , Inc. Superfund Site / 6252120006

Dear Susan:

Enclosed is the Tier III report of the samples submitted to our laboratory on October 19, 2012. For your reference, these analyses have been assigned our service request number P1204334.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA200007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L11-203; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-12-3; Minnesota Department of Health, NELAP Certificate No. 362188; Washington State Department of Ecology, ELAP Lab ID: C946, State of Utah Department of Health, NELAP Certificate No. CA01527Z012-Z; Los Angeles Department of Building and Safety, Approval No: TA00001. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Aguilera

By Kate Aguilera at 9:33 am, Dec 21, 2012

Kate Aguilera
Project Manager

Client: AMEC Environment & Infrastructure, Inc. Service Request No: P1204334
Project: CTS of Asheville , Inc. Superfund Site / 6252120006

CASE NARRATIVE

The samples were received intact under chain of custody on October 19, 2012 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Volatile Organic Compound Analysis

The samples were analyzed in SIM mode for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator.

The Summa canisters were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. Therefore, any result reported below the MRL may be biased high.

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DETAIL SUMMARY REPORT

Client: AMEC Environment & Infrastructure, Inc. Service Request: P1204334
Project ID: CTS of Asheville , Inc. Superfund Site / 6252120006

Date Received: 10/19/2012
Time Received: 10:00

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pfl (psig)	TO-15 - VOC SIM
CAS-01	P1204334-001	Air	10/18/2012	09:15	AC01447	-3.01	3.75	X
CAS-02	P1204334-002	Air	10/18/2012	09:55	AC01541	-3.83	3.68	X
AAS-01	P1204334-003	Air	10/18/2012	10:38	AC01939	-3.67	3.71	X
CAS-03	P1204334-004	Air	10/18/2012	11:05	AC00820	-3.19	3.70	X
AAS-02	P1204334-005	Air	10/18/2012	11:32	AC01763	-3.97	3.55	X
FD-01	P1204334-006	Air	10/18/2012	00:00	AC01225	-4.02	3.77	X
FD-02	P1204334-007	Air	10/18/2012	00:00	AC00817	-3.13	3.68	X
TB-01	P1204334-008	Air	10/18/2012	00:00	AC01948	-14.50	3.58	X

Columbia Analytical Services

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

Requested Turnaround Time in Business Days (Surcharges) please circle:
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) (10 Day-Standard)

CAS Project No.: R1204334

Company Name & Address (Reporting Information): Aimee Environmental + Infrastructure, Inc. 1308 Patton Avenue Asheville NC 28806	Project Name: LTS at Asheville, Inc. Superfund Site
	Project Number: 625212.0006
Project Manager: Matthew Wallace	P.O. # / Billing Information: PO: CC122012911 1308 Patton Avenue Asheville, NC 28806
Phone: 828.252.8130	Fax: 828.251.9690
Email Address for Result Reporting: Susan.kelly@aimee.com	Sampler (Print & Sign): SUSAN KELLY

CAS Contact: K. Aguilera

Analysis Method

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code #- FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	* TO-15		Comments e.g. Actual Preservative or specific instructions
CAS-01	(1)-2.95	10/18/12	9:15	AC01997	FLA00343	-29.6	-7.0	N/A	X		gauge AVG2354
CAS-02	(2)-3.12	10/18/12	9:55	AC01591	FLA00007	-29.4	-8.0	N/A	X		gauge AVG0168
AAS-01	(3)-3.62	10/18/12	10:38	AC01939	FLA00470	-28.0	-6.6	N/A	X		gauge AVG01725
CAS-03	(4)-3.12	10/18/12	11:05	AC00820	FLA00446	-29.0	-6.5	N/A	X		gauge AVG01862
AAS-02	(5)-3.45	10/18/12	11:32	AC01763	FLA00479	-27.7	-11.0	N/A	X		gauge AVG01763
FD-01	(6)-3.97	10/18/12	00:00	AC01225	FLA00458	-29.0	-7.0	N/A	X		gauge AVG01990
FD-02	(7)-3.11	10/18/12	00:00	AC00817	FLA00279	-26.3	-7.4	N/A	X		gauge AVG02199
TB-01	(8)-14.43 -14.42-4 -14.423 -14.34	lab Prepared	lab prepared	AC01948	N/A	N/A	N/A	N/A	X		

Report Tier Levels - please select

Tier I - Results (Default if not specified) ___
Tier II (Results + QC Summaries) ___
Tier III (Results + QC & Calibration Summaries) ___
Tier IV (Data Validation Package) 10% Surcharge X

*See QAPP for compounds

EDD required Yes / No
Type: See QAPP

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time	Received by: (Signature)	Date:	Time:
	10/18/12	16:00	FED EX (Patton Ave Asheville NC)	10/18/12	16:00
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date:	Time:
Kelly				10/19/12	1000

Cooler / Blank Temperature ___ °C

SOC 117 REV 3.1

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Sample Acceptance Check Form

Client: AMEC Environment & Infrastructure, Inc. Work order: P1204334
Project: CTS of Asheville , Inc. Superfund Site / 6252120006
Sample(s) received on: 10/19/12 Date opened: 10/19/12 by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☒	☐	☐
	Location of seal(s)? Top of box, covering opening. Sealing Lid?	☒	☐	☐
	Were signature and date included?	☒	☐	☐
	Were seals intact?	☒	☐	☐
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1204334-001.01	6.0 L Ambient Can					
P1204334-002.01	6.0 L Ambient Can					
P1204334-003.01	6.0 L Ambient Can					
P1204334-004.01	6.0 L Ambient Can					
P1204334-005.01	6.0 L Ambient Can					
P1204334-006.01	6.0 L Ambient Can					
P1204334-007.01	6.0 L Ambient Can					
P1204334-008.01	6.0 L Ambient Can					

Explain any discrepancies: (include lab sample ID numbers):

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

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RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **CAS-01** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-001

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01447
Initial Pressure (psig): -3.01 Final Pressure (psig): 3.75

Canister Dilution Factor: 1.58

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.040	0.0065	ND	0.015	0.0025	
156-60-5	trans-1,2-Dichloroethene	ND	0.040	0.033	ND	0.010	0.0084	
156-59-2	cis-1,2-Dichloroethene	**0.14**	0.040	0.028	**0.036**	0.010	0.0072	
79-01-6	Trichloroethene	**0.67**	0.040	0.0092	**0.12**	0.0074	0.0017	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

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RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **CAS-02** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-002

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01541

Initial Pressure (psig): -3.83 Final Pressure (psig): 3.68

Canister Dilution Factor: 1.69

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	**0.022**	0.042	0.0069	**0.0086**	0.017	0.0027	**J**
156-60-5	trans-1,2-Dichloroethene	ND	0.042	0.035	ND	0.011	0.0090	
156-59-2	cis-1,2-Dichloroethene	**0.098**	0.042	0.030	**0.025**	0.011	0.0077	
79-01-6	Trichloroethene	**0.44**	0.042	0.0098	**0.082**	0.0079	0.0018	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

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RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **AAS-01** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-003

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01939
Initial Pressure (psig): -3.67 Final Pressure (psig): 3.71

Canister Dilution Factor: 1.67

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.042	0.0068	ND	0.016	0.0027	
156-60-5	trans-1,2-Dichloroethene	ND	0.042	0.035	ND	0.011	0.0088	
156-59-2	cis-1,2-Dichloroethene	**0.15**	0.042	0.030	**0.038**	0.011	0.0076	
79-01-6	Trichloroethene	**0.62**	0.042	0.0097	**0.12**	0.0078	0.0018	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

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RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **CAS-03** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-004

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC00820

Initial Pressure (psig): -3.19 Final Pressure (psig): 3.70

Canister Dilution Factor: 1.60

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.040	0.0066	ND	0.016	0.0026	
156-60-5	trans-1,2-Dichloroethene	ND	0.040	0.034	ND	0.010	0.0085	
156-59-2	cis-1,2-Dichloroethene	**0.073**	0.040	0.029	**0.018**	0.010	0.0073	
79-01-6	Trichloroethene	**0.29**	0.040	0.0093	**0.055**	0.0074	0.0017	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

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RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **AAS-02** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-005

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01763
Initial Pressure (psig): -3.97 Final Pressure (psig): 3.55

Canister Dilution Factor: 1.70

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.043	0.0070	ND	0.017	0.0027	
156-60-5	trans-1,2-Dichloroethene	ND	0.043	0.036	ND	0.011	0.0090	
156-59-2	cis-1,2-Dichloroethene	**0.039**	0.043	0.031	**0.0097**	0.011	0.0077	**J**
79-01-6	Trichloroethene	**0.15**	0.043	0.0099	**0.027**	0.0079	0.0018	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

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RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **FD-01** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-006

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01225

Initial Pressure (psig): -4.02 Final Pressure (psig): 3.77

Canister Dilution Factor: 1.73

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.043	0.0071	ND	0.017	0.0028	
156-60-5	trans-1,2-Dichloroethene	ND	0.043	0.036	ND	0.011	0.0092	
156-59-2	cis-1,2-Dichloroethene	**0.14**	0.043	0.031	**0.035**	0.011	0.0079	
79-01-6	Trichloroethene	**0.65**	0.043	0.010	**0.12**	0.0081	0.0019	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

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RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **FD-02** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-007

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC00817
Initial Pressure (psig): -3.13 Final Pressure (psig): 3.68

Canister Dilution Factor: 1.59

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.040	0.0065	ND	0.016	0.0026	
156-60-5	trans-1,2-Dichloroethene	ND	0.040	0.033	ND	0.010	0.0084	
156-59-2	cis-1,2-Dichloroethene	**0.15**	0.040	0.029	**0.039**	0.010	0.0072	
79-01-6	Trichloroethene	**0.65**	0.040	0.0092	**0.12**	0.0074	0.0017	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **TB-01**
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006**

CAS Project ID: P1204334
CAS Sample ID: P1204334-008

Test Code: EPA TO-15 SIM
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19
Analyst: Wida Ang
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: AC01948

Date Collected: 10/18/12
Date Received: 10/19/12
Date Analyzed: 10/29/12
Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.025	0.0041	ND	0.0098	0.0016	
156-60-5	trans-1,2-Dichloroethene	ND	0.025	0.021	ND	0.0063	0.0053	
156-59-2	cis-1,2-Dichloroethene	ND	0.025	0.018	ND	0.0063	0.0045	
79-01-6	Trichloroethene	ND	0.025	0.0058	ND	0.0047	0.0011	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **Method Blank**
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006**

CAS Project ID: P1204334
CAS Sample ID: P121029-MB

Test Code: EPA TO-15 SIM
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19
Analyst: Wida Ang
Sampling Media: 6.0 L Summa Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 10/29/12
Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.025	0.0041	ND	0.0098	0.0016	
156-60-5	trans-1,2-Dichloroethene	ND	0.025	0.021	ND	0.0063	0.0053	
156-59-2	cis-1,2-Dichloroethene	ND	0.025	0.018	ND	0.0063	0.0045	
79-01-6	Trichloroethene	ND	0.025	0.0058	ND	0.0047	0.0011	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

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SURROGATE SPIKE RECOVERY RESULTS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Project ID: P1204334

Test Code: EPA TO-15 SIM
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19
Analyst: Wida Ang
Sampling Media: 6.0 L Summa Canister(s)
Test Notes:

Date(s) Collected: 10/18/12
Date(s) Received: 10/19/12
Date(s) Analyzed: 10/29/12

Client Sample ID	CAS Sample ID	1,2-Dichloroethane-d4 % Recovered	Toluene-d8 % Recovered	Bromofluorobenzene % Recovered	Acceptance Limits	Data Qualifier
Method Blank	P121029-MB	**97**	**101**	**105**	70-130	
Lab Control Sample	P121029-LCS	**102**	**101**	**105**	70-130	
CAS-01	P1204334-001	**96**	**99**	**104**	70-130	
CAS-02	P1204334-002	**94**	**101**	**101**	70-130	
CAS-02	P1204334-002DUP	**94**	**102**	**100**	70-130	
AAS-01	P1204334-003	**95**	**101**	**102**	70-130	
CAS-03	P1204334-004	**96**	**102**	**102**	70-130	
AAS-02	P1204334-005	**96**	**101**	**104**	70-130	
FD-01	P1204334-006	**97**	**99**	**101**	70-130	
FD-02	P1204334-007	**95**	**98**	**101**	70-130	
TB-01	P1204334-008	**97**	**102**	**103**	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

LABORATORY CONTROL SAMPLE SUMMARY

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **Lab Control Sample** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P121029-LCS

Test Code: EPA TO-15 SIM Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: NA
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	CAS Acceptance Limits	Data Qualifier
75-01-4	Vinyl Chloride	4.00	**3.51**	**88**	56-117	
156-60-5	trans-1,2-Dichloroethene	4.04	**3.58**	**89**	61-111	
156-59-2	cis-1,2-Dichloroethene	4.28	**3.83**	**89**	63-112	
79-01-6	Trichloroethene	3.96	**3.68**	**93**	58-113	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

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LABORATORY DUPLICATE SUMMARY RESULTS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Sample ID: **CAS-02** CAS Project ID: P1204334
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Sample ID: P1204334-002DUP

Test Code: EPA TO-15 SIM Date Collected: 10/18/12
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Date Received: 10/19/12
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01541

Initial Pressure (psig): -3.83 Final Pressure (psig): 3.68

Canister Dilution Factor: 1.69

CAS #	Compound	Sample Result		Duplicate Sample Result		Average	% RPD	RPD Limit	Data Qualifier
		µg/m³	ppbV	µg/m³	ppbV	µg/m³			
75-01-4	Vinyl Chloride	0.0221	0.00865	0.0232	0.00909	0.02265	**5**	25	**J**
156-60-5	trans-1,2-Dichloroethene	ND	ND	ND	ND	-	-	25	
156-59-2	cis-1,2-Dichloroethene	0.0976	0.0246	0.0959	0.0242	0.09675	**2**	25	
79-01-6	Trichloroethene	0.442	0.0823	0.439	0.0817	0.4405	**0.7**	25	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.
J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Project ID: P1204334

Method Blank Summary

Test Code: EPA TO-15 SIM
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Lab File ID: 10291204.D
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister(s) Time Analyzed: 07:39
Test Notes:

Client Sample ID	CAS Sample ID	Lab File ID	Time Analyzed
Lab Control Sample	P121029-LCS	10291205.D	08:47
CAS-01	P1204334-001	10291216.D	15:54
CAS-02	P1204334-002	10291217.D	16:27
CAS-02 (Lab Duplicate)	P1204334-002DUP	10291218.D	17:00
AAS-01	P1204334-003	10291219.D	17:34
CAS-03	P1204334-004	10291220.D	18:07
AAS-02	P1204334-005	10291221.D	18:40
FD-01	P1204334-006	10291222.D	19:13
FD-02	P1204334-007	10291223.D	19:46
TB-01	P1204334-008	10291225.D	20:52

RESULTS OF ANALYSIS

Client: **AMEC Environment & Infrastructure, Inc.**
Client Project ID: **CTS of Asheville , Inc. Superfund Site / 6252120006** CAS Project ID: P1204334

Internal Standard Area and RT Summary

Test Code: EPA TO-15 SIM
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/7890A/MS19 Lab File ID: 10291203.D
Analyst: Wida Ang Date Analyzed: 10/29/12
Sampling Media: 6.0 L Summa Canister(s) Time Analyzed: 07:05
Test Notes:

		IS1 (BCM)			IS2 (DFB)			IS3 (CBZ)		
		AREA	#	RT	AREA	#	RT	AREA	#	RT
	24 Hour Standard	117501		11.66	572203		13.41	102303		17.09
	Upper Limit	164501		11.99	801084		13.74	143224		17.42
	Lower Limit	70501		11.33	343322		13.08	61382		16.76
	Client Sample ID									
01	Method Blank	118554		11.66	582056		13.41	105691		17.09
02	Lab Control Sample	120690		11.66	587958		13.40	107943		17.09
03	CAS-01	112296		11.66	558783		13.41	101965		17.09
04	CAS-02	119927		11.66	580007		13.41	107717		17.09
05	CAS-02 (Lab Duplicate)	119077		11.66	583151		13.41	110913		17.09
06	AAS-01	115501		11.66	570719		13.41	105046		17.09
07	CAS-03	112385		11.66	548438		13.41	103256		17.09
08	AAS-02	113068		11.66	553695		13.41	101851		17.09
09	FD-01	112903		11.66	568801		13.41	106129		17.09
10	FD-02	112533		11.66	557767		13.41	99653		17.09
11	TB-01	113494		11.66	554324		13.41	105852		17.09
12										
13										
14										
15										
16										
17										
18										
19										
20										

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = 140% of internal standard area
AREA LOWER LIMIT = 60% of internal standard area
RT UPPER LIMIT = 0.33 minutes of internal standard RT
RT LOWER LIMIT = 0.33 minutes of internal standard RT

# Column used to flag values outside QC limits with an I.
I = Internal standard not within the specified limits. See case narrative.

Response Factor Report MS19

Method : J:\MS19\METHODS\X19102312.M (RTE Integrator)
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Oct 24 08:59:04 2012
Response via : Initial Calibration

Calibration Files
10 =10231205.D 25 =10231206.D 75 =10231207.D 100 =10231208.D 500 =10231209.D
1000 =10231210.D 2500 =10231211.D 9999 =10231212.D 20K =10231213.D =

		Compound	10	25	75	100	500	1000	2500	9999	20K	Avg	%RSD
1)	I	Bromochloromethan	ISTD										
2)	T	Dichlorodifluorom	3.171	3.064	3.008	3.255	2.915	2.702	2.830	2.362	2.457	2.863	10.73
3)	T	Chloromethane		0.676	0.583	0.684	0.583	0.528	0.491	0.528	0.553	0.578	12.05
4)	T	Vinyl Chloride	1.957	1.980	1.928	2.085	1.888	1.773	1.863	1.613	1.726	1.868	7.71
5)	T	Bromomethane		1.483	1.022	1.178	1.003	0.907	0.912	0.932	0.971	1.051	18.57
6)	T	Chloroethane	0.893	0.875	0.851	0.940	0.834	0.789	0.807	0.744	0.756	0.832	7.78
7)	T	Acetone				0.895	0.726	0.669	0.645	0.637	0.627	0.700	14.55
8)	T	Trichlorofluorome	2.391	2.369	2.285	2.504	2.269	2.124	2.215	2.120	2.122	2.267	6.00
9)	T	1,1-Dichloroethen	1.326	1.293	1.255	1.399	1.252	1.182	1.218	1.206	1.224	1.262	5.39
10)	T	Methylene Chlorid			1.613	1.640	1.380	1.302	1.291	1.263	1.265	1.393	11.79
11)	T	Trichlorotrifluor	1.429	1.433	1.360	1.424	1.238	1.158	1.179	1.081	1.151	1.272	10.94
12)	T	trans-1,2-Dichlor	1.663	1.563	1.456	1.592	1.451	1.381	1.380	1.369	1.391	1.472	7.36
13)	T	1,1-Dichloroethan	2.345	2.302	2.079	2.488	2.161	2.030	2.027	2.134	2.083	2.183	7.33
14)	T	Methyl tert-Butyl	4.034	4.031	3.890	4.175	3.748	3.658	3.754	3.715	3.791	3.866	4.57
15)	T	cis-1,2-Dichloroe	1.612	1.604	1.512	1.624	1.477	1.417	1.411	1.430	1.420	1.501	6.03
16)	T	Chloroform	2.494	2.452	2.297	2.538	2.306	2.200	2.152	2.188	2.159	2.309	6.51
17)	S	1,2-Dichloroethan	1.741	1.739	1.712	1.727	1.732	1.719	1.632	1.635	1.595	1.693	3.29
18)	T	1,2-Dichloroethan	2.014	1.991	1.897	2.055	1.876	1.796	1.789	1.740	1.716	1.875	6.60
19)	T	1,1,1-Trichloroet	2.338	2.327	2.221	2.381	2.141	2.085	2.116	2.112	2.144	2.207	5.14
20)	T	Benzene			6.063	6.072	5.068	4.818	4.836	4.739	4.583	5.168	12.20
21)	T	Carbon Tetrachlor	1.551	1.651	1.626	1.739	1.635	1.618	1.676	1.715	1.758	1.663	3.94
22)	I	1,4-Difluorobenze	ISTD										
23)	T	1,2-Dichloropropa	0.264	0.263	0.257	0.280	0.252	0.243	0.245	0.248	0.248	0.255	4.61
24)	T	Bromodichlorometh	0.352	0.346	0.351	0.379	0.353	0.341	0.353	0.364	0.370	0.356	3.37
25)	T	Trichloroethene	0.373	0.363	0.340	0.377	0.334	0.317	0.315	0.318	0.321	0.340	7.39
26)	T	1,4-Dioxane	0.258	0.252	0.243	0.241	0.221	0.207	0.218	0.224	0.226	0.232	7.29
27)	T	cis-1,3-Dichlorop	0.393	0.393	0.399	0.418	0.405	0.399	0.421	0.441	0.446	0.413	4.88
28)	T	trans-1,3-Dichlor	0.343	0.345	0.354	0.355	0.358	0.351	0.382	0.401	0.411	0.367	6.84

(#) Out of Range ### Number of calibration levels exceeded format ###

KR 10/24/12

Method : J:\MS19\METHODS\X19102312.M (RTE Integrator)
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Oct 24 08:59:04 2012
Response via : Initial Calibration

Calibration Files
10 =10231205.D 25 =10231206.D 75 =10231207.D 100 =10231208.D 500 =10231209.D
1000 =10231210.D 2500 =10231211.D 9999 =10231212.D 20K =10231213.D =

		Compound	10	25	75	100	500	1000	2500	9999	20K	Avg		%RSD
29)	T	1,1,2-Trichloroet	0.236	0.230	0.225	0.248	0.226	0.214	0.220	0.220	0.221	0.227		4.46
30)	S	Toluene-d8 (SS2)	1.124	1.097	1.129	1.152	1.150	1.131	1.136	1.113	1.107	1.127		1.65
31)	T	Toluene		1.421	1.257	1.351	1.187	1.123	1.131	1.131	1.067	1.209		10.25
32)	T	1,2-Dibromoethane	0.387	0.333	0.308	0.317	0.296	0.283	0.297	0.302	0.306	0.314		9.74
33)	T	Tetrachloroethene	0.407	0.398	0.386	0.420	0.377	0.354	0.354	0.355	0.356	0.379		6.74
34)	I	Chlorobenzene-d5	ISTD											
35)	T	Chlorobenzene	5.173	5.027	4.724	4.877	4.359	4.178	4.196	4.352	4.043	4.548		9.03
36)	T	Ethylbenzene	8.037	7.847	7.362	7.591	6.984	6.795	7.054	7.326	6.256	7.250		7.58
37)	T	m,p-Xylene	6.808	6.346	5.855	5.993	5.594	5.432	5.684	5.895	4.777	5.821		9.79
38)	T	o-Xylene	6.599	6.623	6.504	6.485	5.984	5.729	5.996	6.281	5.551	6.195		6.38
39)	T	1,1,2,2-Tetrachlo	2.747	2.877	2.820	2.716	2.587	2.568	2.662	2.793	2.627	2.711		3.97
40)	S	Bromofluorobenzen	2.682	2.659	2.648	2.659	2.729	2.734	2.780	2.670	2.605	2.685		1.98
41)	T	1,3-Dichlorobenze	4.470	4.445	4.140	4.091	3.789	3.710	3.818	3.974	3.717	4.017		7.29
42)	T	1,4-Dichlorobenze	4.784	4.566	4.223	4.110	3.796	3.733	3.851	4.065	3.724	4.095		9.19
43)	T	1,2-Dichlorobenze	4.224	4.234	3.997	3.929	3.642	3.590	3.690	3.860	3.564	3.859		6.69
44)	T	1,2,4-Trichlorobe		3.376	3.132	2.597	2.467	2.403	2.446	2.790	2.655	2.733		12.85
45)	T	Naphthalene		1.179	1.091	0.852	0.833	0.822	0.859	1.007	0.793	0.930	E1	15.48
46)	T	Hexachlorobutadie	1.885	1.939	1.819	1.655	1.528	1.480	1.497	1.637	1.554	1.666		10.43

KR 10/24/12

(#) Out of Range ### Number of calibration levels exceeded format ###
X19102312.M Wed Oct 24 09:27:24 2012

TO-15 (SIM) INITIAL CALIBRATION CONCENTRATIONS

0.2ng/L Working Standard ID: **S25-10221217**
4ng/L Working Standard ID: **S25-10221215**
5ng/L Working Standard ID: **0**
20ng/L Working Standard ID: **0**
50ng/L Working Standard ID: **0**
200ng/L Working Standard ID: **S25-10221209**

Std. Canister Utilized (ng/L)	0.2	0.2	0.2	5	20	20	50	50	200
Injection Amt(mL)	50	125	375	20	25	50	50	200	100
Compound Name	Conc. 10pg	Conc. 25pg	Conc. 75pg	Conc. 100pg	Conc. 500pg	Conc. 1000pg	Conc. 2500pg	Conc. 10,000pg	Conc. 20,000pg
Freon-12	10.20	25.50	76.500	102.0	510	1020	2550	10200	20400
Chloromethane	9.90	24.75	74.250	99.0	495	990	2475	9900	19800
Vinyl Chloride	10.00	25.00	75.000	100.0	500	1000	2500	10000	20000
1,3-Butadiene	12.20	30.50	91.500	122.0	610	1220	3050	12200	24400
Bromomethane	10.00	25.00	75.000	100.0	500	1000	2500	10000	20000
Chloroethane	10.00	25.00	75.000	100.0	500	1000	2500	10000	20000
Acrolein	10.40	26.00	78.000	104.0	520	1040	2600	10400	20800
Acetone	53.90	134.75	404.250	539.0	2695	5390	13475	53900	107800
Freon-11	10.20	25.50	76.500	102.0	510	1020	2550	10200	20400
1,1-Dichloroethene	10.90	27.25	81.750	109.0	545	1090	2725	10900	21800
Methylene Chloride	10.70	26.75	80.250	107.0	535	1070	2675	10700	21400
Freon-113	10.70	26.75	80.250	107.0	535	1070	2675	10700	21400
trans-1,2-Dichloroethene	10.50	26.25	78.750	105.0	525	1050	2625	10500	21000
1,1-Dichloroethane	10.40	26.00	78.000	104.0	520	1040	2600	10400	20800
Methyl tert-Butyl Ether	10.60	26.50	79.500	106.0	530	1060	2650	10600	21200
cis-1,2-Dichloroethene	10.80	27.00	81.000	108.0	540	1080	2700	10800	21600
Chloroform	10.80	27.00	81.000	108.0	540	1080	2700	10800	21600
1,2-Dichloroethane	10.50	26.25	78.750	105.0	525	1050	2625	10500	21000
1,1,1-Trichloroethane	10.30	25.75	77.250	103.0	515	1030	2575	10300	20600
Benzene	11.00	27.50	82.500	110.0	550	1100	2750	11000	22000
Carbon Tetrachloride	11.00	27.50	82.500	110.0	550	1100	2750	11000	22000
1,2-Dichloropropane	10.30	25.75	77.250	103.0	515	1030	2575	10300	20600
Bromodichloromethane	10.60	26.50	79.500	106.0	530	1060	2650	10600	21200
Trichloroethene	10.30	25.75	77.250	103.0	515	1030	2575	10300	20600
1,4-Dioxane	10.80	27.00	81.000	108.0	540	1080	2700	10800	21600
cis-1,3-Dichloropropene	9.90	24.75	74.250	99.0	495	990	2475	9900	19800
trans-1,3-Dichloropropene	11.10	27.75	83.250	111.0	555	1110	2775	11100	22200
1,1,2-Trichloroethane	10.20	25.50	76.500	102.0	510	1020	2550	10200	20400
Toluene	10.60	26.50	79.500	106.0	530	1060	2650	10600	21200
1,2-Dibromoethane	10.50	26.25	78.750	105.0	525	1050	2625	10500	21000
Tetrachloroethene	9.60	24.00	72.000	96.0	480	960	2400	9600	19200
Chlorobenzene	10.60	26.50	79.500	106.0	530	1060	2650	10600	21200
Ethylbenzene	10.40	26.00	78.000	104.0	520	1040	2600	10400	20800
m,p-Xylenes	20.40	51.00	153.000	204.0	1020	2040	5100	20400	40800
o-Xylene	10.10	25.25	75.750	101.0	505	1010	2525	10100	20200
1,1,2,2-Tetrachloroethane	9.80	24.50	73.500	98.0	490	980	2450	9800	19600
1,3-Dichlorobenzene	10.70	26.75	80.250	107.0	535	1070	2675	10700	21400
1,4-Dichlorobenzene	10.70	26.75	80.250	107.0	535	1070	2675	10700	21400
1,2-Dichlorobenzene	10.40	26.00	78.000	104.0	520	1040	2600	10400	20800
1,2-Dibromo-3-chloropropane	10.50	26.25	78.750	105.0	525	1050	2625	10500	21000
1,2,4-Trichlorobenzene	10.60	26.50	79.500	106.0	530	1060	2650	10600	21200
Naphthalene	9.50	23.75	71.250	95.0	475	950	2375	9500	19000
Hexachloro-1,3-butadiene	10.60	26.50	79.500	106.0	530	1060	2650	10600	21200

KPR 10/24/12

Calibration Status Report MS19

Method : J:\MS19\METHODS\X19102312.M (RTE Integrator)
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Oct 24 08:59:04 2012
Response via : Initial Calibration

#	ID	Conc	ISTD Conc	Path\File
1	10	10	1000	J:\MS19\DATA\2012_10\23\10231205.D
2	25	26	1000	J:\MS19\DATA\2012_10\23\10231206.D
3	75	77	1000	J:\MS19\DATA\2012_10\23\10231207.D
4	100	102	1000	J:\MS19\DATA\2012_10\23\10231208.D
5	500	510	1000	J:\MS19\DATA\2012_10\23\10231209.D
6	1000	1020	1000	J:\MS19\DATA\2012_10\23\10231210.D
7	2500	2550	1000	J:\MS19\DATA\2012_10\23\10231211.D
8	9999	10200	1000	J:\MS19\DATA\2012_10\23\10231212.D
9	20K	20400	1000	J:\MS19\DATA\2012_10\23\10231213.D

#	ID	Update Time	Quant Time	Acquisition Time
1	10	Oct 24 08:56 2012	Oct 24 07:17 2012	23 Oct 2012 6:46 pm
2	25	Oct 24 08:57 2012	Oct 24 07:17 2012	23 Oct 2012 7:19 pm
3	75	Oct 24 08:57 2012	Oct 24 07:17 2012	23 Oct 2012 7:52 pm
4	100	Oct 24 08:57 2012	Oct 24 08:40 2012	23 Oct 2012 8:24 pm
5	500	Oct 24 08:57 2012	Oct 24 07:17 2012	23 Oct 2012 8:57 pm
6	1000	Oct 24 08:57 2012	Oct 24 07:17 2012	23 Oct 2012 9:30 pm
7	2500	Oct 24 08:57 2012	Oct 24 07:17 2012	23 Oct 2012 10:03 pm
8	9999	Oct 24 08:58 2012	Oct 24 07:17 2012	23 Oct 2012 10:36 pm
9	20K	Oct 24 08:59 2012	Oct 24 07:17 2012	23 Oct 2012 11:09 pm

X19102312.M Wed Oct 24 09:27:27 2012

KC 10/24/12

ICV/LCS Standard Concentrations

Std. Canister Utilized: S25-10221205
Working Std Conc.: 4
Injection Amt(mL) 125

Compound Name	Conc. 500pg
Freon-12	505
Chloromethane	490
Vinyl Chloride	500
1,3-Butadiene	525
Bromomethane	500
Chloroethane	505
Acrolein	510
Acetone	2590
Freon-11	525
1,1-Dichloroethene	545
Methylene Chloride	530
Freon-113	530
trans-1,2-Dichloroethene	505
1,1-Dichloroethane	515
Methyl tert-Butyl Ether	510
cis-1,2-Dichloroethene	535
Chloroform	555
1,2-Dichloroethane	520
1,1,1-Trichloroethane	510
Benzene	520
Carbon Tetrachloride	530
1,2-Dichloropropane	510
Bromodichloromethane	510
Trichloroethene	495
1,4-Dioxane	515
cis-1,3-Dichloropropene	490
trans-1,3-Dichloropropene	545
1,1,2-Trichloroethane	505
Toluene	520
1,2-Dibromoethane	520
Tetrachloroethene	475
Chlorobenzene	520
Ethylbenzene	515
m,p-Xylenes	1030
o-Xylene	500
1,1,2,2-Tetrachloroethane	495
1,3-Dichlorobenzene	515
1,4-Dichlorobenzene	530
1,2-Dichlorobenzene	510
1,2-Dibromo-3-chloropropane	505
1,2,4-Trichlorobenzene	500
Naphthalene	445
Hexachloro-1,3-butadiene	520

10/24/12

J:\MS19\DATA\2012_10\23\10231216.D

TO-15/SIM ICV Recovery Summary - MS19

Data File Name:	10231216.D
Data File Path:	J:\MS19\DATA\2012_10\23\
Operator:	KR
Instrument Name:	MS19
Sample Name:	500pg TO-15 SIM ICV STD
Misc Info:	S25-10221201/S25-10221205
Date Acquired:	10/24/2012 12:48
Acq. Method File:	TO15SIM2.M

#	Compound Name	Ret. Time	Amount Spiked (pg)	Amount Found (pg)	Percent Recovery	Lower Limit	Upper Limit	Flag
2)	Dichlorodifluoromethane (CFC 12)	5.14	505.00	522.65	103.5	70	130	*
3)	Chloromethane	5.52	490.00	483.09	98.6	70	130	*
4)	Vinyl Chloride	6.04	500.00	499.83	100.0	70	130	*
5)	Bromomethane	6.86	500.00	480.87	96.2	70	130	*
6)	Chloroethane	7.21	505.00	496.88	98.4	70	130	*
7)	Acetone	8.19	2590.00	2559.30	98.8	70	130	*
8)	Trichlorofluoromethane	8.43	525.00	483.46	92.1	70	130	*
9)	1,1-Dichloroethene	9.27	545.00	537.24	98.6	70	130	*
10)	Methylene Chloride	9.42	530.00	519.08	97.9	70	130	*
11)	Trichlorotrifluoroethane	9.76	530.00	508.06	95.9	70	130	*
12)	trans-1,2-Dichloroethene	10.47	505.00	490.98	97.2	70	130	*
13)	1,1-Dichloroethane	10.68	515.00	523.80	101.7	70	130	*
14)	Methyl tert-Butyl Ether	10.74	510.00	514.17	100.8	70	130	*
15)	cis-1,2-Dichloroethene	11.50	535.00	531.54	99.4	70	130	*
16)	Chloroform	11.78	555.00	534.99	96.4	70	130	*
18)	1,2-Dichloroethane	12.47	520.00	524.86	100.9	70	130	*
19)	1,1,1-Trichloroethane	12.72	510.00	503.23	98.7	70	130	*
20)	Benzene	13.13	520.00	532.15	102.3	70	130	*
21)	Carbon Tetrachloride	13.27	530.00	521.77	98.4	70	130	*
23)	1,2-Dichloropropane	13.86	510.00	506.46	99.3	70	130	*
24)	Bromodichloromethane	14.02	510.00	500.97	98.2	70	130	*
25)	Trichloroethene	14.06	495.00	495.77	100.2	70	130	*
26)	1,4-Dioxane	14.02	515.00	523.54	101.7	70	130	*
27)	cis-1,3-Dichloropropene	14.79	490.00	485.59	99.1	70	130	*
28)	trans-1,3-Dichloropropene	15.21	545.00	542.07	99.5	70	130	*
29)	1,1,2-Trichloroethane	15.39	505.00	504.15	99.8	70	130	*
31)	Toluene	15.64	520.00	512.64	98.6	70	130	*
32)	1,2-Dibromoethane	16.21	520.00	491.00	94.4	70	130	*
33)	Tetrachloroethene	16.58	475.00	466.46	98.2	70	130	*
35)	Chlorobenzene	17.13	520.00	489.48	94.1	70	130	*
36)	Ethylbenzene	17.41	515.00	488.07	94.8	70	130	*
37)	m,p-Xylene	17.54	1030.00	954.77	92.7	70	130	*
38)	o-Xylene	17.93	500.00	474.10	94.8	70	130	*
39)	1,1,2,2-Tetrachloroethane	17.91	495.00	442.02	89.3	70	130	*
41)	1,3-Dichlorobenzene	19.49	515.00	474.00	92.0	70	130	*
42)	1,4-Dichlorobenzene	19.55	530.00	470.33	88.7	70	130	*
43)	1,2-Dichlorobenzene	19.85	510.00	460.26	90.2	70	130	*
44)	1,2,4-Trichlorobenzene	21.46	500.00	404.67	80.9	70	130	*
45)	Naphthalene	21.59	445.00	358.11	80.5	70	130	*
46)	Hexachlorobutadiene	21.92	520.00	422.39	81.2	70	130	*

KR 10/24/12

Evaluate Continuing Calibration Report

Data Path : J:\MS19\DATA\2012_10\29\
Data File : 10291203.D
Acq On : 29 Oct 2012 7:05
Operator : WA
Sample : 500pg TO-15 SIM CCV STD
Misc : S25-10221201/S25-10221215
ALS Vial : 15 Sample Multiplier: 1

Quant Time: Oct 29 07:32:44 2012
Quant Method : J:\MS19\METHODS\X19102312.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Oct 24 08:59:04 2012
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	I	Bromochloromethane (IS1)	1.000	1.000	0.0	93	0.00
2	T	Dichlorodifluoromethane (CF	2.863	2.645	7.6	84	0.00
3	T	Chloromethane	0.578	0.495	14.4	79	0.00
4	T	Vinyl Chloride	1.868	1.637	12.4	80	0.00
5	T	Bromomethane	1.051	0.911	13.3	84	0.00
6	T	Chloroethane	0.832	0.729	12.4	81	0.00
7	T	Acetone	0.700	0.677	3.3	87	0.00
8	T	Trichlorofluoromethane	2.267	2.087	7.9	85	0.00
9	T	1,1-Dichloroethene	1.262	1.149	9.0	85	0.00
10	T	Methylene Chloride	1.393	1.249	10.3	84	0.00
11	T	Trichlorotrifluoroethane	1.272	1.130	11.2	85	0.00
12	T	trans-1,2-Dichloroethene	1.472	1.322	10.2	84	0.00
13	T	1,1-Dichloroethane	2.183	1.957	10.4	84	0.00
14	T	Methyl tert-Butyl Ether	3.866	3.478	10.0	86	0.00
15	T	cis-1,2-Dichloroethene	1.501	1.339	10.8	84	0.00
16	T	Chloroform	2.309	2.063	10.7	83	0.00
17	S	1,2-Dichloroethane-d4 (SS1)	1.693	1.694	-0.1	91	0.00
18	T	1,2-Dichloroethane	1.875	1.676	10.6	83	0.00
19	T	1,1,1-Trichloroethane	2.207	1.950	11.6	84	0.00
20	T	Benzene	5.168	4.449	13.9	81	0.00
21	T	Carbon Tetrachloride	1.663	1.513	9.0	86	0.00
22	I	1,4-Difluorobenzene (IS2)	1.000	1.000	0.0	94	0.00
23	T	1,2-Dichloropropane	0.255	0.222	12.9	83	0.00
24	T	Bromodichloromethane	0.356	0.312	12.4	83	0.00
25	T	Trichloroethene	0.340	0.305	10.3	86	0.00
26	T	1,4-Dioxane	0.232	0.201	13.4	85	0.00
27	T	cis-1,3-Dichloropropene	0.413	0.361	12.6	84	0.00
28	T	trans-1,3-Dichloropropene	0.367	0.315	14.2	83	0.00
29	T	1,1,2-Trichloroethane	0.227	0.202	11.0	84	0.00
30	S	Toluene-d8 (SS2)	1.127	1.113	1.2	91	0.00
31	T	Toluene	1.209	1.060	12.3	84	0.00
32	T	1,2-Dibromoethane	0.314	0.266	15.3	84	0.00
33	T	Tetrachloroethene	0.379	0.341	10.0	85	0.00
34	I	Chlorobenzene-d5 (IS3)	1.000	1.000	0.0	91	0.00
35	T	Chlorobenzene	4.548	4.116	9.5	86	0.00
36	T	Ethylbenzene	7.250	6.573	9.3	86	0.00
37	T	m,p-Xylene	5.821	5.271	9.4	86	0.00

10/29/12

Evaluate Continuing Calibration Report

Data Path : J:\MS19\DATA\2012_10\29\
Data File : 10291203.D
Acq On : 29 Oct 2012 7:05
Operator : WA
Sample : 500pg TO-15 SIM CCV STD
Misc : S25-10221201/S25-10221215
ALS Vial : 15 Sample Multiplier: 1

Quant Time: Oct 29 07:32:44 2012
Quant Method : J:\MS19\METHODS\X19102312.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Oct 24 08:59:04 2012
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
38	T	o-Xylene	6.195	5.625	9.2	86	0.00
39	T	1,1,2,2-Tetrachloroethane	2.711	2.317	14.5	82	0.00
40	S	Bromofluorobenzene (SS3)	2.685	2.852	-6.2	95	0.00
41	T	1,3-Dichlorobenzene	4.017	3.536	12.0	85	0.00
42	T	1,4-Dichlorobenzene	4.095	3.555	13.2	85	0.00
43	T	1,2-Dichlorobenzene	3.859	3.407	11.7	85	0.00
44	T	1,2,4-Trichlorobenzene	2.733	2.239	18.1	83	0.00
45	T	Naphthalene	9.295	7.180	22.8	79	0.00
46	T	Hexachlorobutadiene	1.666	1.429	14.2	85	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0

APPENDIX G

DATA VALIDATION

DATA VALIDATION REPORT
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina

Introduction

Indoor/crawlspace and ambient air samples were collected at the CTS of Asheville, Inc. Superfund Site in Asheville, North Carolina (Site) in October 2012 and submitted for off-site laboratory analysis. Samples were analyzed by Columbia Analytical Services, Inc. (part of the ALS Group) located in Simi Valley, California. Results were reported in Sample Delivery Group (SDG) P1204334.

A list of samples included in this Data Validation Report is presented in Table G.1. A summary of the analytical results is presented in Table G.2. Samples were analyzed by the following method:

- Volatile organic compounds (VOCs) by USEPA Method TO-15 (Site-specific list)

Deliverables for the off-site laboratory analyses included a Level IV data package.

Data validation was completed based on procedures in the USEPA Region 4 Data Validation Standard Operating Procedures (Region 4 SOP) for Organic Analysis (USEPA, 2008), in conjunction with the laboratory's Method TO-15 SIM Standard Operating Procedure and the VI Assessment Quality Assurance Project Plan, Revision 2 (QAPP; AMEC, 2012). Quality control limits listed in the Region 4 SOP and QAPP were used during the data evaluation. The validation included the following evaluations:

- Lab report narrative
- Sample collection and chain of custody
- Data package completeness
- Holding times
- QC data (blanks, instrument tune and calibrations, lab control samples, duplicates, and surrogate recovery)
- Internal standard response and retention time
- Data transcription
- Calculations
- Electronic data reporting
- Data qualification

The following laboratory or data validation qualifiers are used in the final data presentation:

U = target analyte is not detected at the reported detection limit
J = concentration is estimated

Results are interpreted to be usable as reported by the laboratory unless discussed in the following sections.

Data Validation Results

Quality control issues were not identified during the data validation. The RPD calculations for the field duplicate samples are included in Table G.3.

A subset of project TO-15 compounds (cis-1,2-dichloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride) was reported in the data set.

References Cited

AMEC, 2012. Vapor Intrusion Assessment Work Plan: Quality Assurance Project Plan (Revision 2), September 11, 2012.

Columbia Analytical Services, Inc., 2010. Standard Operating Procedure for Determination of Volatile Organic Compounds in Air Samples Collected in Specially Prepared Canisters and Gas Collection Bags by Gas Chromatography/Mass Spectrometry (GC/MS), SOP Code: VOA-TO15, Revision 18, December 22, 2010.

USEPA, 2008. Data Validation Standard Operating Procedures for Organic Analyses; USEPA Region 4, Science and Ecosystem Support Division Quality Assurance Section, MTSB, Revision 3.1; Athens, Georgia; August 2008.

Data Validator: Tige L. Cunningham, NRCC-EAC
Date: 11/26/2012

Reviewed By: Chris S. Ricardi, NRCC-EAC (Quality Assurance Manager)
Date: 11/28/2012

Chris Ricardi

TABLE G.1
Data Validation Report: Sample Summary
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
AMEC Project 6252-12-0060

SDG	Method	Lab Sample ID	Field Sample ID	Sample Date
P1204334	TO-15 SIM	P1204334-001	CAS-01	10/18/2012
P1204334	TO-15 SIM	P1204334-002	CAS-02	10/18/2012
P1204334	TO-15 SIM	P1204334-003	AAS-01	10/18/2012
P1204334	TO-15 SIM	P1204334-004	CAS-03	10/18/2012
P1204334	TO-15 SIM	P1204334-005	AAS-02	10/18/2012
P1204334	TO-15 SIM	P1204334-006	FD-01 (CAS-01)	10/18/2012
P1204334	TO-15 SIM	P1204334-007	FD-02 (AAS-01)	10/18/2012
P1204334	TO-15 SIM	P1204334-008	TB-01	10/18/2012

Prepared By: TLC 11/28/12
Checked By: CSR 11/28/12

TABLE G.2
Data Validation Report: Sample Result Summary
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
AMEC Project 6252-12-0006

	Field Sample ID	AAS-01		AAS-02		CAS-01		CAS-02	
	Sample Date	10/18/12		10/18/12		10/18/12		10/18/12	
	Lab Sample ID	P1204334-003		P1204334-005		P1204334-001		P1204334-002	
Method	**Parameter**	**Final Result**	**Final Qual**	**Final Result**	**Final Qual**	**Final Result**	**Final Qual**	**Final Result**	**Final Qual**
TO-15 SIM	cis-1,2-Dichloroethene	0.15		0.039	J	0.14		0.098	
TO-15 SIM	trans-1,2-Dichloroethene	0.035	U	0.036	U	0.033	U	0.035	U
TO-15 SIM	Trichloroethene	0.62		0.15		0.67		0.44	
TO-15 SIM	Vinyl chloride	0.0068	U	0.0070	U	0.0065	U	0.022	J

	Field Sample ID	CAS-03		FD-01		FD-02		TB-01	
	Sample Date	10/18/12		10/18/12		10/18/12		10/18/12	
	Lab Sample ID	P1204334-004		P1204334-006		P1204334-007		P1204334-008	
Method	**Parameter**	**Final Result**	**Final Qual**	**Final Result**	**Final Qual**	**Final Result**	**Final Qual**	**Final Result**	**Final Qual**
TO-15 SIM	cis-1,2-Dichloroethene	0.073		0.14		0.15		0.018	U
TO-15 SIM	trans-1,2-Dichloroethene	0.034	U	0.036	U	0.033	U	0.021	U
TO-15 SIM	Trichloroethene	0.29		0.65		0.65		0.0058	U
TO-15 SIM	Vinyl chloride	0.0066	U	0.0071	U	0.0065	U	0.0041	U

Notes:
1. Concentrations are in micrograms per cubic meter ($\mu g/m^3$).
2. U - constituent not detected at the reported detection limit.
3. J - concentration is estimated.

Prepared By: WCG 11/28/12
Checked By: CSR 11/28/12

TABLE G.3
Data Validation Report: Field Duplicate RPD Results
CTS of Asheville, Inc. Superfund Site
Asheville, North Carolina
AMEC Project 6252-12-0006

Sample ID	Consituent	Field Sample Result	Flag	Duplicate Sample Result	Flag	RPD (%)
CAS-01/FD-01	cis-1,2-Dichloroethene	0.14		0.14		0
CAS-01/FD-01	trans-1,2-Dichloroethene	0.033	U	0.036	U	
CAS-01/FD-01	Trichloroethene	0.67		0.65		3
CAS-01/FD-01	Vinyl chloride	0.0065	U	0.0071	U	
AAS-01/FD-02	Cis-1,2-Dichloroethene	0.15		0.15		0
AAS-01/FD-02	trans-1,2-Dichloroethene	0.035	U	0.033	U	
AAS-01/FD-02	Trichloroethene	0.62		0.65		5
AAS-01/FD-02	Vinyl chloride	0.0068	U	0.0065	U	

Notes:
1. Concentrations are in micrograms per cubic meter ($\mu g/m^3$).
2. RPD - relative percent difference (between duplicate results).
3. U - constituent not detected at the reported detection limit.

Prepared By: TLC 11/28/12
Checked By: CSR 11/28/12

APPENDIX H

RISK ASSESSMENT CALCULATION TABLES

TABLE H.1
Summary of Laboratory Analytical Results

CRAWLSPACE/BASEMENT

Address	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC	Comments
(b)(6)	CAS-01 / FD-01	***0.67 / 0.65***	0.14 / 0.14	<0.033 / <0.036	<0.0065 / <0.0071	crawlspace
	CAS-02	***0.44***	0.098	<0.035	0.022 J	finished basement
	CAS-03	**0.29**	0.073	<0.034	<0.0066	crawlspace
Target Indoor VISL / Residential Air RSL		0.21	NE	6.3	0.16	
Target Indoor VISL with 0.53 crawlspace attenuation factor		0.40	NE	12	0.30	

AMBIENT

Location	Sample ID	TCE	cis-1,2-DCE	trans-1,2-DCE	VC	Comments
Nea(b)(6)	AAS-01 / FD-02	***0.62 / 0.65***	0.15 / 0.15	<0.035 / <0.033	<0.0068 / <0.0065	between structure and unnamed tributary
Western common area	AAS-02	0.15	0.039 J	<0.036	<0.007	upwind (wind blowing from the west)

Notes:

1. Concentrations in micrograms per cubic meter ($\mu g/m^3$).
2. TCE = trichloroethene; cis-1,2-DCE = cis-1,2-dichloroethene; trans-1,2-DCE = trans-1,2-dichloroethene; VC = vinyl chloride
3. VISL - Vapor Intrusion Screening Level calculated using the USEPA Office of Solid Waste and Emergency Response VISL Calculator (Version 2.0, May 2012) for residential land use assuming 10^6 target risk and 0.1 target hazard quotient.
4. RSL - Regional Screening Level for Residential Air, November 2012.
5. NE - a screening level has not been established for constituent.
6. **Bold font** indicates concentration greater than Target Residential Indoor VISL*italic font* indicates concentration greater than Target Residential Indoor VISL with vapor attenuation factor applied for crawlspace per VI Work Plan. No attenuation factor applied for basement.
7. '<' - Constituent not detected at or above indicated laboratory reporting limit.

Prepared By: LWC 12/2/2012
Checked By: LMS 12/2/2012

TABLE H.2
Calculations of Risk to Indoor Air Concentrations – (b)(6)
Adult Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration In Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Crawlspace	0.355	Sampled	3.40E-01	3.70E-01	1.46E-01	2.0E-03	1.0E-06	3.1E-06	IRIS	0.2	3.7E-07	4.5E-07	8E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the crawlspace (CAS-01), multiplied by the attenuation factor of 0.53 to account for attenuation prior to indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)+(ED10 x AF10)+(ED14 x AF 14)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	30	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
ED10 = Exposure Duration 10 (mutagen)	10	(years)
ED14 = Exposure Duration≥14 (mutagen)	14	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AF10 = Age-Dependent Adjustment Factor	3	
AF14 = Age-Dependent Adjustment Factor	1	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	262,800	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.3
Calculations of Risk to Indoor Air Concentrations – (b)(6)
Child Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Crawlspace	0.355	Sampled	3.40E-01	1.56E-01	2.92E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.2	1.6E-07	9.0E-08	2E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the crawlspace (CAS-01), multiplied by the attenuation factor of 0.53 to account for attenuation prior to indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	6	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	52,560	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.4
Calculations of Risk to Indoor Air Concentrations – (b)(6) [redacted]
Adult Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Crawlspace	0.154	Sampled	1.48E-01	1.60E-01	6.33E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.1	1.6E-07	2.0E-07	4E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the crawlspace (CAS-03), multiplied by the attenuation factor of 0.53 to account for attenuation prior to indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)+(ED10 x AF10)+(ED14 x AF 14)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	30	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
ED10 = Exposure Duration 10 (mutagen)	10	(years)
ED14 = Exposure Duration ≥14 (mutagen)	14	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AF10 = Age-Dependent Adjustment Factor	3	
AF14 = Age-Dependent Adjustment Factor	1	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	262,800	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.5
Calculations of Risk to Indoor Air Concentrations – (b)(6)
Child Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Crawlspace	0.154	Sampled	1.48E-01	6.75E-02	1.27E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.1	6.8E-08	3.9E-08	1E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the crawlspace (CAS-03), multiplied by the attenuation factor of 0.53 to account for attenuation prior to indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	6	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	52,560	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.6
Calculations of Risk to Indoor Air Concentrations – (b)(6)
Adult Resident (Current and Futur
Inhalation of Indoor Air

Parameter	Concentration In Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Basement	0.44	Sampled	4.22E-01	4.58E-01	1.81E-01	2.0E-03	1.0E-06	3.1E-06	IRIS	0.2	4.6E-07	5.6E-07	1E-06

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the basement (CAS-02), without attenuation factor to account for attenuation prior to indoor air

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)+(ED10 x AF10)+(ED14 x AF 14)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	30	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
ED10 = Exposure Duration 10 (mutagen)	10	(years)
ED14 = Exposure Duration ≥14 (mutagen)	14	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AF10 = Age-Dependent Adjustment Factor	3	
AF14 = Age-Dependent Adjustment Factor	1	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	262,800	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.7
Calculations of Risk to Indoor Air Concentrations – (b)(6)
Child Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Basement	0.44	Sampled	4.22E-01	1.93E-01	3.62E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.2	1.9E-07	1.1E-07	3E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the basement (CAS-02), without attenuation factor to account for attenuation prior to indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	6	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	52,560	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.8
Calculations of Risk to Indoor Air Concentrations – Ambient Air AAS-01
Adult Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Ambient Air	0.65	Sampled	6.23E-01	6.77E-01	2.67E-01	2.0E-03	1.0E-06	3.1E-06	IRIS	0.3	6.8E-07	8.3E-07	2E-06

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the field duplicate (FD-02) for ambient air sample (AAS-01); no attenuation assumed between outdoor and indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)+(ED10 x AF10)+(ED14 x AF 14)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	30	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
ED10 = Exposure Duration 10 (mutagen)	10	(years)
ED14 = Exposure Duration ≥14 (mutagen)	14	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AF10 = Age-Dependent Adjustment Factor	3	
AF14 = Age-Dependent Adjustment Factor	1	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	262,800	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.9
Calculations of Risk to Indoor Air Concentrations – Ambient Air AAS-01
Child Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration in Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Ambient Air	0.65	Sampled	6.23E-01	2.85E-01	5.34E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.3	2.8E-07	1.7E-07	5E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the field duplicate (FD-02) for ambient air sample (AAS-01); no attenuation assumed between outdoor and indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	6	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	52,560	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.10
Calculations of Risk to Indoor Air Concentrations – Ambient Air AAS-02
Adult Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration In Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Ambient Air	0.15	Sampled	1.44E-01	1.56E-01	6.16E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.07	1.6E-07	1.9E-07	3E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the ambient air sample (AAS-02); no attenuation asssumed between outdoor and indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)+(ED10 x AF10)+(ED14 x AF 14)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	30	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
ED10 = Exposure Duration 10 (mutagen)	10	(years)
ED14 = Exposure Duration ≥14 (mutagen)	14	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AF10 = Age-Dependent Adjustment Factor	3	
AF14 = Age-Dependent Adjustment Factor	1	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	262,800	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.11
Calculations of Risk to Indoor Air Concentrations – Ambient Air AAS-02
Child Resident (Current and Future)
Inhalation of Indoor Air

Parameter	Concentration In Air (ug/m^3)	Exposure Value Type [1]	Exposure Concentration [2]			Toxicity Values			Source	Hazard Quotient [3] (Unitless)	Kidney Excess Cancer Risk [4] (Unitless)	Liver Excess Cancer Risk [5] (Unitless)	Total Excess Cancer Risk [6] (Unitless)
			Noncarcinogen (ug/m^3)	Mutagenic (ug/m^3)	Carcinogen (ug/m^3)	Inhalation RfC (mg/m^3)	Inhalation Kidney Mutagenic Unit Risk $(ug/m^3)^{-1}$	Inhalation Liver Unit Risk $(ug/m^3)^{-1}$					
Volatile Organic Compounds													
Trichloroethylene - Ambient Air	0.15	Sampled	1.44E-01	6.58E-02	1.23E-02	2.0E-03	1.0E-06	3.1E-06	IRIS	0.07	6.6E-08	3.8E-08	1E-07

Notes:

m^3 = cubic meters

mg = milligram

RfC = Reference Concentration

ug = micrograms

IRIS = Integrated Risk Information System (TCE data most recently revised September 28, 2011)

[1] Concentration detected in the ambient air sample (AAS-02); no attenuation asssumed between outdoor and indoor air.

[2] Exposure Concentration = See Equations below

[3] Hazard Quotient (Noncarcinogens) = Noncarcinogen Exposure Concentration/RfC x 1000 ug/mg

[4] Kidney Excess Cancer Risk = Mutagenic Exposure Concentration x Inhalation Kidney Mutagenic Unit Risk

[5] Liver Excess Cancer Risk = Carcinogenic Exposure Concentration x Inhalation Liver Unit Risk

[6] Total Excess Cancer Risk = Kidney Excess Cancer Risk + Liver Excess Cancer Risk

Carcinogen Exposure Concentration = CA x ET x EF x ED/ AT_c where:

Mutagenic Exposure Concentration = CA x ET x EF x ((ED2 x AF 2)+(ED4 x AF4)) / ATc where:

Noncarcinogen Exposure Concentration = CA x ET x EF x ED/AT_{nc} where:

CA = Constituent Concentration in Air (estimated)	See above	(ug/m^3)
ET = Exposure Time (hours per day)	24	(hours/day)
EF = Exposure Frequency (days per year)	350	(days/year)
ED = Exposure Duration (years)	6	(years)
ED2 = Exposure Duration 2 (mutagen)	2	(years)
ED4 = Exposure Duration 4 (mutagen)	4	(years)
AF2 = Age-Dependent Adjustment Factor	10	
AF4 = Age-Dependent Adjustment Factor	3	
AT_{nc} = Averaging Time (Noncarcinogen, hours)	52,560	
AT_c = Averaging Time (Carcinogenic, hours)	613,200	

Prepared By: LWC 12/07/12

Checked By: LMS 12/11/12

TABLE H.12
Summary of Risk to Indoor Air Concentrations
Adult and Child Residents (Current and Future)
Inhalation of Indoor Air

Location	Adult		Child	
	Hazard Quotient	Excess Cancer Risk	Hazard Quotient	Excess Cancer Risk
(b)(6)	0.2	8E-07	0.2	2E-07
	0.2	1E-06	0.2	3E-07
	0.1	4E-07	0.1	1E-07
Ambient Air AAS-01 (nea(b)(6)	0.3	2E-06	0.3	5E-07
Ambient Air AAS-02 (western common area)	0.07	3E-07	0.07	1E-07

Prepared By: LWC 12/07/12
Checked By: LMS 12/11/12

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303

December 21, 2012

(b)(6)
Asheville, North Carolina 28803

SUBJECT: Sampling Results for Property at (b)(6)

Dear Mr. (b)(6)

During the week of October 15, 2012, AMEC Environment & Infrastructure, Inc., on behalf of CTS Corporation, conducted air sampling on your property at (b)(6) as directed and overseen by the United States Environmental Protection Agency (EPA). The purpose of this sampling was to determine whether organic vapors were present in the air of your basement that may be related to the CTS of Asheville, Inc. Superfund Site (CTS Site) and to evaluate if any further response actions are necessary to protect public health and the environment.

One air sample was collected in your basement over a 24-hour period. The air sample was analyzed for four chemicals found at or related to those at the CTS Site.

The laboratory results are provided in the following summary table. The laboratory data sheets, which are the source from which the summary table was compiled, are available upon request.

Summary Table: (b)(6)

Compound	Concentration
trichloroethene	0.44 $\mu g/m^3$
cis-1,2-dichloroethene	0.098 $\mu g/m^3$
trans-1,2-dichloroethene	ND
vinyl chloride	0.022 $\mu g/m^3$ J

Notes:
1. $\mu g/m^3$ – micrograms per cubic meter.
2. ND – compound was not detected at or above the laboratory reporting limit.
3. J – the concentration is estimated.

The sampling results have been reviewed by the EPA. Concentrations of trichloroethene, cis-1,2-dichloroethene, and vinyl chloride were detected in the air sample collected from your home. A screening-level risk assessment was conducted to determine if the detected compounds pose an unacceptable risk to occupants in your residence. A risk assessment is the process to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media, now or in the future. The results of the risk assessment

indicate that the concentrations of the detected compounds do not pose an unacceptable risk to occupants in your residence.

For more information regarding risk assessment, please see EPA's website at http://epa.gov/riskassessment/basicinformation.htm#risk.
For more information about the CTS of Asheville, Inc. Superfund Site, please see http://www.epa.gov/region4/superfund/sites/npl/northcarolina/millsgapnc.html.
For general information about the Superfund program, which cleans up contaminated sites, please see http://www.epa.gov/superfund/.

If you have any questions or would like additional information, please feel free to contact me directly at (404) 562-8760 or by e-mail at Urquhart-Foster.Samantha@epa.gov. For general questions regarding EPA involvement at the CTS Site, please contact Angela Miller, Public Affairs Specialist, at (404) 562-8561, or by e-mail at Miller.Angela@epa.gov.

Sincerely,

Samantha Urquhart-Foster
Remedial Project Manager
EPA Region 4
Telephone: (404) 562-8760
E-mail: Urquhart-Foster.Samantha@epa.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303

December 21, 2012

(b)(6)
Asheville, North Carolina 28803

SUBJECT: Sampling Results for Property at (b)(6)

Dea(b)(6)

During the week of October 15, 2012, AMEC Environment & Infrastructure, Inc., on behalf of CTS Corporation, conducted air sampling on your property at (b)(6) as directed and overseen by the United States Environmental Protection Agency (EPA). The purpose of this sampling was to determine whether organic vapors were present in the air of your crawlspace that may be related to the CTS of Asheville, Inc. Superfund Site (CTS Site) and to evaluate if any further response actions are necessary to protect public health and the environment.

One air sample was collected in your crawlspace over a 24-hour period. The air sample was analyzed for four chemicals found at or related to those at the CTS Site.

The laboratory results are provided in the following summary table. The laboratory data sheets, which are the source from which the summary table was compiled, are available upon request.

Summary Table:(b)(6)

Compound	Concentration
trichloroethene	0.29 $\mu g/m^3$
cis-1,2-dichloroethene	0.073 $\mu g/m^3$
trans-1,2-dichloroethene	ND
vinyl chloride	ND

Notes:
1. $\mu g/m^3$ – micrograms per cubic meter.
2. ND – compound was not detected at or above the laboratory reporting limit.

The sampling results have been reviewed by the EPA. Concentrations of trichloroethene and cis-1,2-dichloroethene were detected in the crawlspace air sample collected from your home. A screening-level risk assessment was conducted to determine if the detected compounds pose an unacceptable risk to occupants in your residence. A risk assessment is the process to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media, now or in the future. The results of the risk assessment

indicate that the concentrations of the detected compounds do not pose an unacceptable risk to occupants in your residence.

For more information regarding risk assessment, please see EPA's website at http://epa.gov/riskassessment/basicinformation.htm#risk.
For more information about the CTS of Asheville, Inc. Superfund Site, please see http://www.epa.gov/region4/superfund/sites/npl/northcarolina/millsgapnc.html.
For general information about the Superfund program, which cleans up contaminated sites, please see http://www.epa.gov/superfund/.

If you have any questions or would like additional information, please feel free to contact me directly at (404) 562-8760 or by e-mail at Urquhart-Foster.Samantha@epa.gov. For general questions regarding EPA involvement at the CTS Site, please contact Angela Miller, Public Affairs Specialist, at (404) 562-8561, or by e-mail at Miller.Angela@epa.gov.

Sincerely,

Samantha Urquhart-Foster
Remedial Project Manager
EPA Region 4
Telephone: (404) 562-8760
E-mail: Urquhart-Foster.Samantha@epa.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303

December 21, 2012

(b)(6)
Asheville, North Carolina 28803

SUBJECT: Sampling Results for Property a(b)(6)

Dear(b)(6)

During the week of October 15, 2012, AMEC Environment & Infrastructure, Inc., on behalf of CTS Corporation, conducted air sampling on your property a(b)(6) as directed and overseen by the United States Environmental Protection Agency (EPA). The purpose of this sampling was to determine whether organic vapors were present in the air of your crawlspace that may be related to the CTS of Asheville, Inc. Superfund Site (CTS Site) and to evaluate if any further response actions are necessary to protect public health and the environment.

Two air samples were collected in your crawlspace over a 24-hour period (one of the samples was analyzed as a duplicate for comparison purposes). The air samples were analyzed for four chemicals found at or related to those at the CTS Site.

The laboratory results are provided in the following summary table. The laboratory data sheets, which are the source from which the summary table was compiled, are available upon request.

Summary Table:(b)(6)

Compound	Concentration
trichloroethene	0.67 $\mu g/m^3$
cis-1,2-dichloroethene	0.14 $\mu g/m^3$
trans-1,2-dichloroethene	ND
vinyl chloride	ND
Notes: 1. $\mu g/m^3$ – micrograms per cubic meter. 2. ND – compound was not detected at or above the laboratory reporting limit.	

The sampling results have been reviewed by the EPA. Concentrations of trichloroethene and cis-1,2-dichloroethene were detected in the crawlspace air samples collected from your home. A screening-level risk assessment was conducted to determine if the detected compounds pose an unacceptable risk to occupants in your residence. A risk assessment is the process to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals in

contaminated environmental media, now or in the future. The results of the risk assessment indicate that the concentrations of the detected compounds do not pose an unacceptable risk to occupants in your residence.

For more information regarding risk assessment, please see EPA's website at http://epa.gov/riskassessment/basicinformation.htm#risk.
For more information about the CTS of Asheville, Inc. Superfund Site, please see http://www.epa.gov/region4/superfund/sites/npl/northcarolina/millsgapnc.html.
For general information about the Superfund program, which cleans up contaminated sites, please see http://www.epa.gov/superfund/.

If you have any questions or would like additional information, please feel free to contact me directly at (404) 562-8760 or by e-mail at Urquhart-Foster.Samantha@epa.gov. For general questions regarding EPA involvement at the CTS Site, please contact Angela Miller, Public Affairs Specialist, at (404) 562-8561, or by e-mail at Miller.Angela@epa.gov.

Sincerely,

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